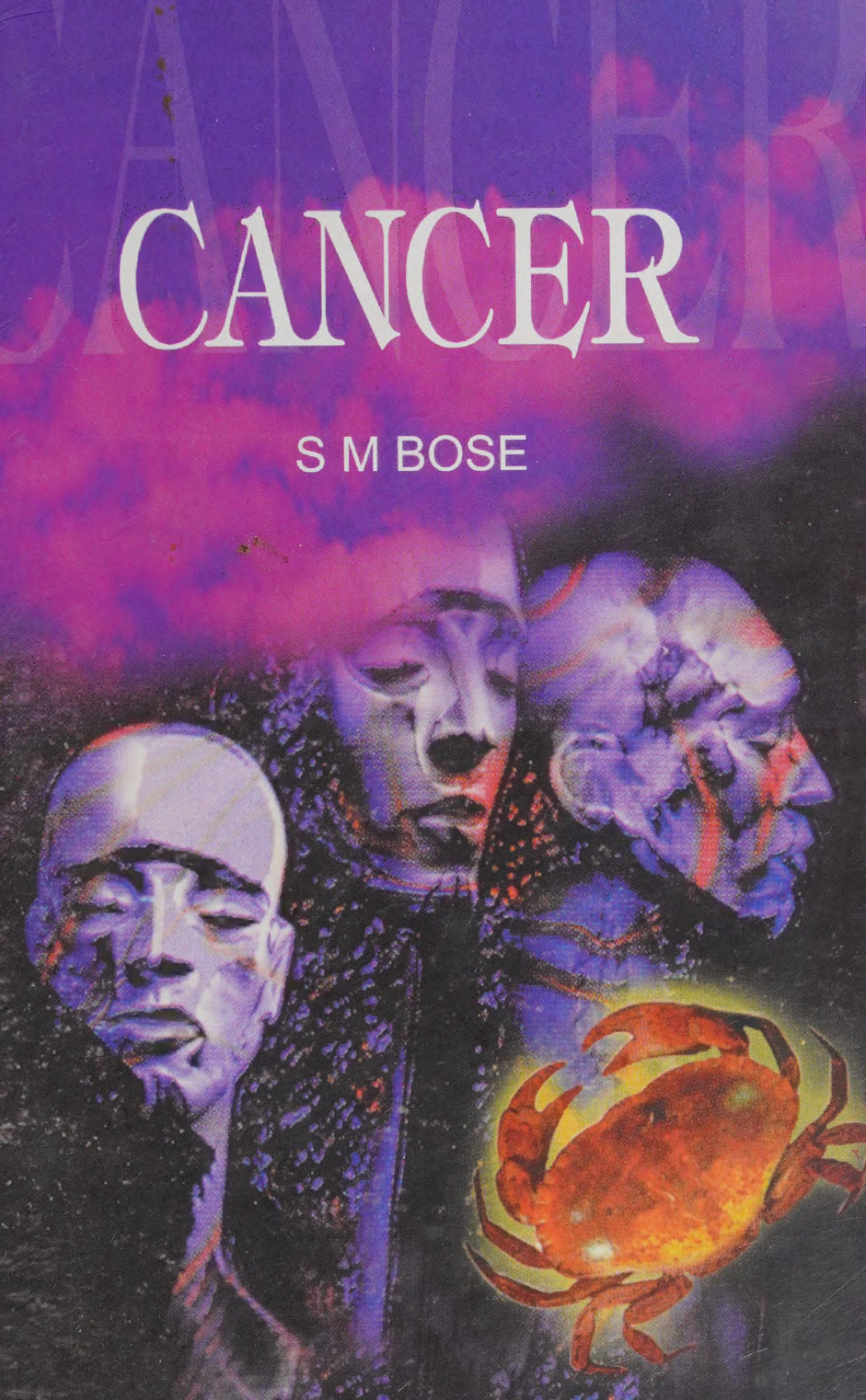
CANCER

S M BOSE



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CANCER

Popular Science

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S.M. BOSE

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Foreword

Cancer is one of the most feared diseases that afflicts our civilisation today. Cancer is often dreaded due to ignorance and fear in the minds of the public on account of lack of knowledge on the subject. At any given time there are 45 to 50 lakh cancer patients in our country and this number is likely to increase in the years to come.

To be well informed about any subject is very important. Individually, good health is the most treasured possession that one can hope and cherish for. Dr Bose needs to be congratulated on bringing out this book on *Cancer*, meant for the lay reader, which gives in a nutshell, knowledge about the disease, its causation, early diagnosis and effective treatment which is now possible in most cases.

A healthy lifestyle, which does not always mean total abstention, is the most important factor in preventing cancer. Avoid tobacco, excessive alcohol and excessive intake of fat; eat wisely and avoid extra rich, non-vegetarian diet; eat plenty of fruits and vegetables; be careful at the workplace—these are some of the proven facts in avoiding cancer—and yet, if one is destined to have cancer due to his/her genes or ill-luck, then the best way out is to fight it scientifically with courage, confidence and hope rather than fear, despair and a defeatist attitude.

This is his message and I am sure the readers will benefit by browsing through this well-timed publication.

Tata Memorial Centre
Bombay

P.B. DESAI
Director

Preface to New Edition

It is a matter of great pleasure and satisfaction to undertake the revision of this book *Cancer* and to update it. The book is now available in a number of regional languages and is being translated into a few more. The book seems to have become quite popular.

The number of cancer patients seeking medical help has increased tremendously during the past few years, possibly because of increased longevity of life, better diagnostic tools, and better public awareness. But, unfortunately, the majority of patients visit the specialist only at an advanced stage and, I feel, the main reason for this, is the lack of knowledge and awareness about the disease. I will, therefore, like this book to become more popular, be available in every home so that more and more people may have the basic understanding of the facts of the disease process. Identification of the disease in an early stage plus initiation of proper treatment at the earliest are the only known ways to combat the disease and obtain a possible cure.

The book has been completely revised; a couple of chapters have been added. A number of my friends and colleagues have helped me in this, among whom special mention must be made of Dr Kala Vasistha, Dr Ram Marwah, Dr A.K. Goswami, Dr D. Behera, Dr D.P. Singh, Dr Kanchan Mukherjee, Dr Kamal Kumar Mahawar and others; and I am grateful to all of them for their help and cooperation. Dr Shibu has drawn (redrawn by NBT) the sketches, and this will add to a better understanding of the book. I am thankful

to Mr Sunil Kumar Sharma and Mrs Raman Kumari for the typing work. My sincere thanks to Ms Manju Gupta, editor of NBT for her support and meticulous editing work.

I hope the readers will find the present presentation more useful.

Chandigarh S.M. BOSE

Introduction

Man is mortal. He knows well enough that he will die some day. Still the desire to live as long as possible is always there. Diseases are our biggest enemies because they prevent us not only from enjoying a happy and healthy life, but also cut short our stay on this earth.

A race has been going on between disease and scientific investigations. Most of the infectious diseases, like tuberculosis, typhoid, malaria, infective hepatitis, tetanus, cholera, etc., which kill lakhs and lakhs of people every year in underdeveloped or developing countries, have been completely wiped off from the developed nations. However, these have gradually been replaced by heart disease and cancer, which are now considered the biggest killers.

It is estimated that in India, approximately 10 lakh patients of cancer are seen every year. Recently published data of Indian Cancer Registry reveal a sharp rise in the number of cancer cases in India, with one in 15 men and one in 12 women likely to develop cancer during their lifetime.

Fortunately, cancer has not assumed such alarming proportions in our country as in the USA, Japan, Britain, etc., but it is feared that as the longevity of life increases with control of other diseases, cancer shall make an increased appearance and take an increased toll of life. Therefore, if we want to defend ourselves against cancer, we should acquire some knowledge about it.

Cancer is notorious in the sense that the disease can affect almost anyone, irrespective of age, sex, social or

financial status. Also, cancer can attack almost any tissue in any part of the body. As its biological behaviour is unpredictable, cancer can mimic other diseases, thus creating problems for both the patient and the treating doctor.

There are warning signals, known as 'danger signals', the presence of which should lead a person to his doctor for a thorough medical examination and investigation. The key to proper and effective treatment is early detection and early institution of a well-planned treatment.

The fight against cancer demands lifetime attention on the part of the patient, including regular medical check-ups to tackle every successive problem, as and when it appears.

1

CAUSAL FACTORS AND PREVENTION

Certain risk factors are known to increase the chances of developing cancer above the level of risk in the general population.

How do you prevent cancer? This is a million-dollar question and a direct comprehensive answer to this is not possible, although billions of dollars have been spent and are being spent presently all over the world in search of this answer.

A disease can be prevented only if you know what actually causes the disease and for cancer we still do not have this answer, although it is known that constant irritation to the tissue for a very long period of time can give rise to cancer. This irritant may be a physical or chemical agent or a microbial organism. Take, for example, the sun's rays—its ultraviolet rays can give rise to cancer of skin, as commonly seen in Australia and New Zealand. Chemical agents like coal tar, mercury, insecticides, etc. can give rise to cancer in workers handling these agents. But the biggest culprit is tobacco, smoking of which gives rise to lung cancer and chewing of it leads to cancer of mouth, foodpipe, etc. Because of the prevalence of the tobacco-chewing habit in India, particularly in Madhya Pradesh, Bihar, Uttar Pradesh, Andhra Pradesh, cancer of mouth is the commonest type of cancer seen in our country. Microbes too can give rise to cancer, for example, Burkitt's tumour, as seen in African countries.

As mentioned earlier, it is not only the presence of the irritant but its presence for a prolonged period that time (the

aging factor) becomes a major factor in the development of cancer. Although there are certain exceptions to this (for example, certain childhood cancers like leukaemia, brain and kidney tumours, lymphoblastoma, etc. can occur even in newborn children), the vast majority of the common cancers occur in the fifth and sixth decades of life, and the incidence increases further with the passage of time. It is known that we cannot stop the aging process, but we can surely identify some factors in our lifestyle that may be contributing to the development of cancer and we can try to take actions to nullify their effects.

All living beings, such as humans, insects and bacteria are made up of cells. Each bacterium is made up of a single cell, with human beings having the unique feature of being composed of millions of cells that are specially adapted to carry out particular functions. For instance, the sex cells—the sperm and the ovum—carry out the functions of reproduction (in fact, we started life when these two cells, ovum and sperm, came together). Similarly, a muscle cell is especially adapted to contract and produce movement; a kidney cell to assist in producing and excreting urine.

You may ask what a cell is. A cell is the basic unit of all living things which can reproduce itself exactly. A collection of cells of one kind is called a tissue, e.g. muscle is one type of tissue. A collection of tissues constitute the organs, such as the heart, liver, lung, etc., and each organ is part of the human body.

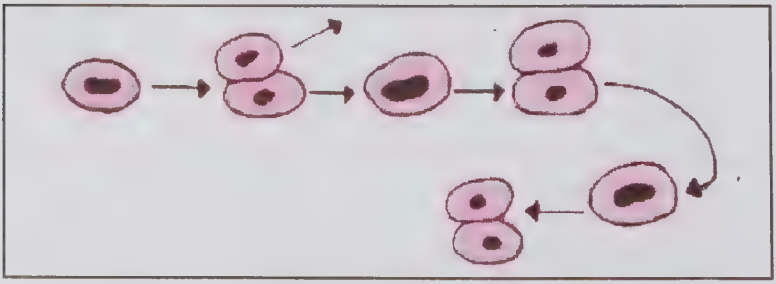


Fig. 1: Normal cell division; multiplying in a disciplined manner.

As the human body grows from infancy to adulthood, the cells belonging to different tissues and organs divide and subdivide until no more increase of cells is required, except for the normal wear and tear of the body. The growth and maintenance of the human body continues through an orderly division, multiplication and replacement of cells to form and renew tissues and organs (Fig. 1). As long as the cells divide only when necessary and stop when their job is done, the right balance of cells in the body is maintained.

In some human beings, for reasons which we do not

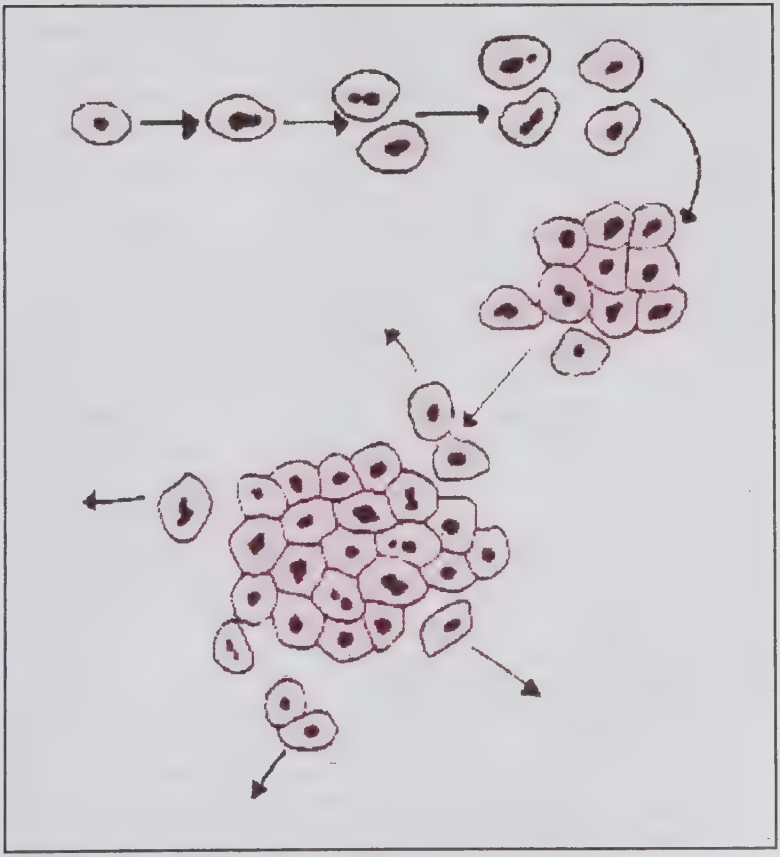


Fig. 2: Cell division resulting in cancer formation. Note different shapes and sizes of cells and nuclei.

understand fully, the cells in a particular part of the body start multiplying in a disorderly, uncontrolled manner. These cells not only grow in number but penetrate the adjoining tissues and this indiscriminate and uninterrupted growth is known as malignant tumour or cancer (Fig. 2).

This uncontrolled multiplication of cells (cancerous growth) has some characteristics:

- When the cells divide, the resultant cells may or may not be like the precursor or the mother cell
- These cells grow in all directions, just like the roots of a tree and occupy the spaces in between the tissue cells and break up all barriers to spread into the neighbouring tissues and organs. In this way, the cancerous tumour not only gets adhered to superficial and deeper structures like the muscles, bones, skin, but can be fixed to the nerves, blood vessels and other important structures depending upon its location.
- Some of these cells break loose from the parent tissue and enter the blood vessels and lymphatics.

Sometimes this cancerous growth may penetrate the neighbouring tissues and structures like the veins, arteries and lymphatics. Veins and arteries are like tubes which carry blood to and from the heart while the lymphatics are ducts or vessels through which flows a fluid called lymph. Lymph is derived from the tissue fluid that occupies the space between cells. Lymph is emptied from the largest duct of the lymphatic system into two big veins in the neck to merge with the bloodstream. Most of the large lymph vessels have along their course enlarged structures, called lymph nodes. The nodes trap various particles, manufacture white blood cells and also produce antibodies. Cancer cells can get detached from the parent tumour, travel via the lymphatics and can get arrested in the lymph nodes, resulting in their enlargement. The regional lymph nodes are the first ones to get enlarged and subsequently the distant lymph nodes can also get involved.

These detached cancer cells can be also be carried by

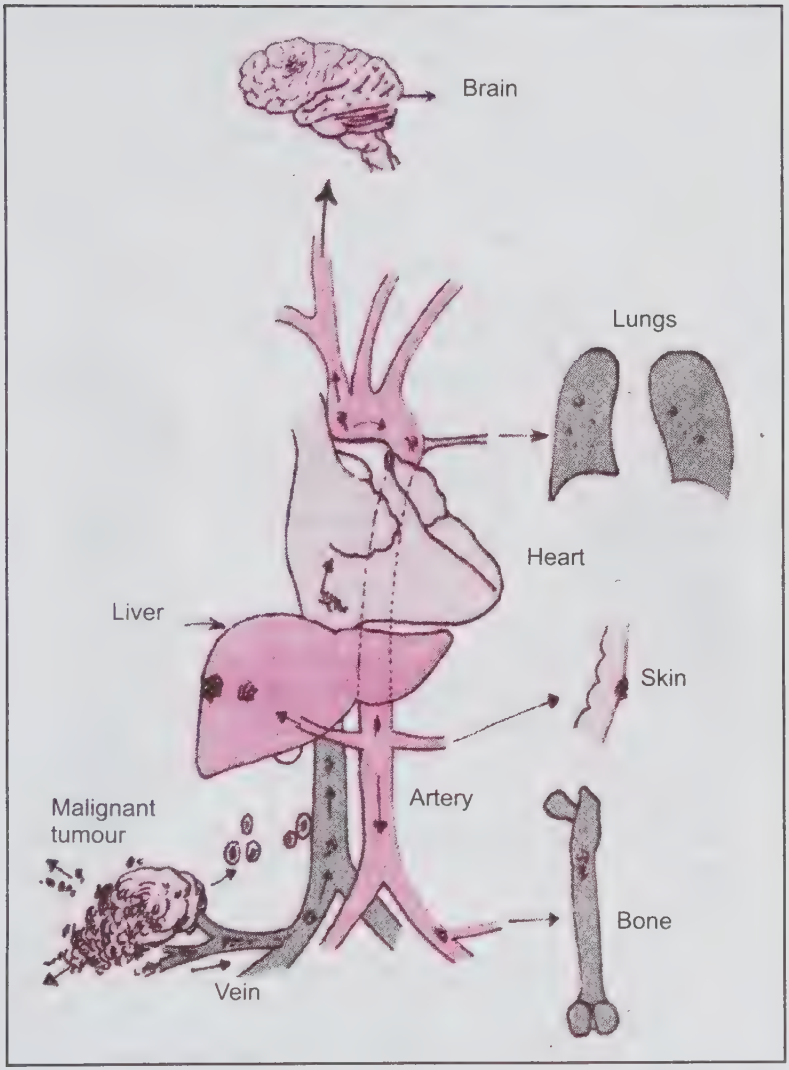


Fig. 3 a: Spread of cancer to different parts of the body, common sites being the liver, lymph nodes, lung, bone, skin and brain.

the blood to distant organs, far away from the primary site, to get lodged in the new tissues and start growing and multiplying. This gives rise to what is known as secondary deposits or metastases. The common sites for such distant

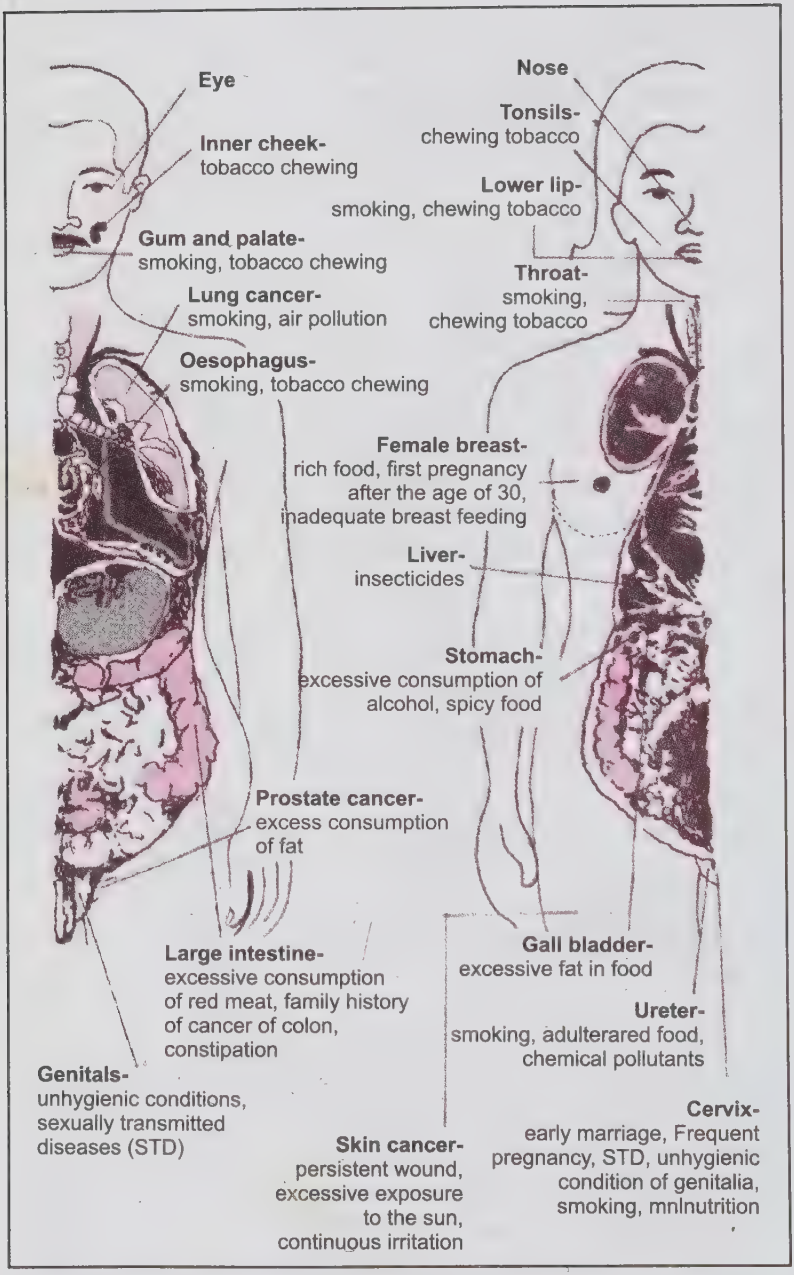

Eye
Inner cheek- tobacco chewing
Gum and palate- smoking, tobacco chewing
Lung cancer- smoking, air pollution
Oesophagus- smoking, tobacco chewing
Nose
Tonsils- chewing tobacco
Lower lip- smoking, chewing tobacco
Throat- smoking, chewing tobacco
Female breast- rich food, first pregnancy after the age of 30, inadequate breast feeding
Liver- insecticides
Stomach- excessive consumption of alcohol, spicy food
Prostate cancer- excess consumption of fat
Large intestine- excessive consumption of red meat, family history of cancer of colon, constipation
Genitals- unhygienic conditions, sexually transmitted diseases (STD)
Skin cancer- persistent wound, excessive exposure to the sun, continuous irritation
Gall bladder- excessive fat in food
Ureter- smoking, adulterared food, chemical pollutants
Cervix- early marriage, Frequent pregnancy, STD, unhygienic condition of genitalia, smoking, mnlnutrition

Fig. 3 b: Common factors and predisposing conditions.

deposits are lungs, liver, bones, brain, skin, etc. (Fig. 3). Because of the rapid multiplication of these cancer cells and their invasive character, these secondary deposits cause damage to some parts of the organs where they get lodged, and subsequently lead to impairment and irregular functioning of the organs. This is one of the main reasons why cancer is a difficult disease to be cured.

Cancer is known as *localised* or *early* when it has not invaded the neighbouring structures or its cells have not got lodged in distant organs and lymph nodes. It can be treated easily at this early stage by removing the tissue involved, with a reasonable hope of complete cure. But then, this is also the stage when the cancer is small in size and does not pose any problem to the patient, as a result of which the patient does not get alarmed nor does he seek medical advice. This in turn prevents the doctor from diagnosing the disease at an early stage.

Cancer is known as *locally advanced* when it has invaded the neighbouring structures, some of which may be important. At this stage the tumour cannot be excised (surgically removed) completely. Cancer is known as *advanced* when it has got secondary deposits or metastases as mentioned before.

Some of the important causal and risk factors are described in the following pages.

Causal Factors

Cancer, in general, is not heredity linked and the disease is not passed on to the offsprings but in a few cases, children, grandchildren and close relatives of the same family are more susceptible to develop a particular type of cancer than the normal population.

Breast cancer is one such example, where 5 per cent of the patients of this disease may be found to have the familial tendency. Research is going on to identity women with genetic abnormalities, who may develop breast cancer in later years of their lives. Identification of such women will prompt

conduction of intense screening programmes so as to detect the cancer at the earliest stage possible, when the treatment is expected to achieve cent per cent cure. Recently it has been reported that the human genome has been completely mapped and it is hoped that in the near future, it will be possible to pinpoint the chromosomal abnormality that gives rise to a particular disease. It is also hoped that genetic manipulation may be able to repair the damaged DNA, so as to prevent the development of breast cancer in these genetically predisposed women. The same holds true for other types of cancer. In USA, cases have been reported when women with a strong family history have undergone removal of both the breasts (bilateral subcutaneous mastectomy) and reconstruction, so as to prevent the development of breast cancers later on. This is not an accepted modality of management and I do not think this is recommended presently. Regular screening for breast cancer is advisable for every woman above the age of 40 years (earlier, by the high-risk women) in order to detect the disease at an early stage.

In addition, ovarian cancer, kidney cancer in children, retinoblastoma (tumour of the eye) are the other tumours, which have a strong hereditary predisposition and children of parents who have any of these tumours should undergo regular screening for detection of the disease at an early stage.

As has been said, "You cannot choose your parents and hence, cannot prevent these hereditary conditions, but you can surely choose the right screening programme to detect the cancerous disease at the earliest and then get the best of the treatment at an early stage."

Physical Agents

Any physical agent that causes constant irritation for a long time can give rise to cancer like, for example, ultraviolet rays coming from sunlight cause cancer of skin, as is being commonly seen amongst the farmers of Australia and New

Zealand. These farmers work in a bent position and bare chested; hence, the sunlight directly falls upon their back and they are liable to get cancer of skin. For prevention of this cancer, they are advised to wear sola hats and cover their bare backs.

Similarly in Kashmir, people during winter months keep a basket with burning coal (*kangri*) next to their abdominal skin to keep themselves warm. This direct heat because of constant irritation gives rise to cancer of skin in the abdominal region. The preventive measure is easily understood and can be readily implemented.

Radiation

It is a fact that radiation is used for the treatment of cancer and at the same time it can also induce cancer because of continued exposure. The dropping of atomic bombs over Hiroshima and Nagasaki not only killed people instantaneously besides causing large-scale devastation, but the presence of radioactivity in the area produced a higher incidence of cancer, most notably leukaemia, cancer of breast, lung, large intestine, skin, etc.

Cancer risk from radiation can be reduced by:

- restricting the X-ray examinations as far as possible, unless absolutely essential
- taking safety measures while working in the environment of increased radiation, e.g. X-ray departments, laboratories using radioactive isotopes, industries using radiation energy, etc.
- avoiding X-rays during pregnancy, particularly so during the first trimester, as it is harmful for the foetus

Smoking

As mentioned earlier, tobacco is the biggest offender and it has been linked to cancer of tissues and organs. Smoking is directly linked to lung cancer; and the number of cigarettes smoked per day, the duration for which smoking is being continued, the quality of tobacco used in the cigarette are

the factors that are directly linked to development of lung cancer. It should be clearly understood that all those who smoke do not develop lung cancer and similarly, lung cancer also occurs in people who have never smoked in their lifetime, but, the fact remains that smoking definitely increases the risk of cancer.

Avoidance of smoking is the single important factor that can prevent lung cancer to a great extent. It is difficult to stop smoking but then it is the only way to reduce the chances of getting lung cancer. Short of quitting smoking, one can cut down on smoking, avoid inhaling the smoke, use a good brand of tobacco, use cigarettes with filters, and avoid smoking in a closed environment like a closed room, bus, etc.

It is also known that persons who may not be actually smoking but are inhaling the smoke because of their proximity with smokers (e.g. spouses of smokers) have a definite risk of developing lung cancer. Similarly, avoidance of chewing of tobacco can reduce the chances of developing mouth cancer.

Chemical Agents

For almost 80 years, it has been known that a number of chemical agents contain cancer-causing components and these chemical agents are known as *carcinogens*. Coal tar, mercury, aniline dyes, asbestos, are some of the chemicals that are definitely known to be carcinogenic in nature. Persons handling these chemical agents must take preventive measures by using gloves, mask, gumboots, etc. so that they neither come in direct contact with these agents nor inhale the fumes.

Alcohol

The relationship between consumption of alcohol and development of cancer is not yet well established but it is supposed to be one of the contributing factors for cancer of the mouth and oesophagus. Heavy consumption of alcohol

definitely gives rise to cirrhosis of liver, which can cause cancer of liver later on.

Recently some beneficial effects of the safe level of drinking (not more than two small pegs a day), particularly for the heart, has been claimed to be beneficial but heavy drinking is definitely injurious to health.

Diet

A balanced, nutritious diet is necessary for our well-being but the type of diet that we are consuming in modern times is far from ideal. We like to consume fast food which has lots of fat, spices and condiments, and very little of fibres; this is definitely not good for health. High intake of fat has been associated with different types of cancers, more particularly with cancer of the breast.

It has also been established that a high intake of fats alongwith decreased intake of fibres definitely has a higher risk of development of cancer of the large intestine. The reason is not very well established but it is presumed that people consuming less of fibres usually suffer from constipation and therefore, the stool remains in the large intestine for a much longer time. Some toxic products are always present in the stools which, because of constipation, remain in contact with the wall of the large intestine for a longer period, and subsequently have a deleterious effect on the inner lining of the large intestine, resulting in cancer of the colon. This can be the reason why cancer of colon is more common in Western countries than in Asian and African countries and also because a lot of beef and very little of vegetables is consumed in the West whereas in Asia and Africa, more of vegetables and less of non-vegetarian food is taken.

Further, the prevailing custom of consumption of smoked fish in the Far Eastern countries (Japan, Korea, Philippines, etc.) is responsible for the high incidence of cancer of stomach.

It is also important to note that the use of colouring

agents and preservatives in food items should be kept to the bare minimum. And, one should not consume too much of condiments and spices.

Hormones

Hormones have influence on the development of cancer, e.g. breast cancer. It has been estimated that the following category of women are more prone to developing breast cancer: a spinster; a woman who has not given birth to a child or has given birth to her first child after the age of 30 years; a woman who has a long menstrual cycle (early menarche, i.e. onset of menstrual cycle and late menopause, i.e. cessation of menstruation); a mother who has not breast-fed her children. Under these conditions there is hormonal imbalance, which can give rise to breast cancer. Similarly, women with fibrocystic disease of the breasts (which is also supposed to be due to hormonal imbalance) are more likely to develop breast cancer than women without this problem.

Cancer of prostate in males is also linked to hormonal imbalance.

Social, Economic and Ethnic Factors

There seems to be a definite relationship between the socio-economic status and cancer frequency. For example, cancer of skin and cervix are more common in low-income groups, while breast cancer is more often found among women from the high socio-economic group. In our own country, it has been observed that cancer of cervix is the commonest form of cancer seen amongst the females; but with modernisation, cancer of breast seems to be overtaking and leading the list. This has particularly been seen in metropolitan cities, like Mumbai and Delhi.

Statistics also reveal that some types of cancers are more commonly seen in a particular ethnic group; for example, the incidence of breast cancer in India is highest in the Parsi community. Cancer of penis is rare amongst Muslims, probably because of circumcision in early childhood.

Environmental Reasons

It is generally accepted that atmospheric pollution can increase the risk of cancer in man. Animal experiments, using particulates collected from polluted air, have resulted in the induction of benign tumours (innocent, non-cancerous) and malignant tumours of the skin.

Chronic Diseases of Organs

A number of benign, chronic diseases of organs over a period of time can develop into cancer; for example, dysplastic lesions of the breast, chronic inflammation of the uterine cervix, chronic inflammatory lesions of the stomach, chronic inflammation of the gall bladder, multiple polyposis of the colon, chronic inflammatory diseases of the colon like ulcerative colitis and Crohn's disease, warts, etc. It is therefore, mandatory that people having these diseases should have regular check-ups so that development of cancer can be detected at the earliest possible and appropriate treatment undertaken subsequently.

2

WARNING SIGNALS

As in most other diseases, it is essential to diagnose cancer at the earliest so as to start proper treatment forthwith, for then only can we hope to increase the chances of a cure.

Cancer, when it invades the body, produces some responses which had not been there earlier on, and which a patient with keen observation feels and observes.

Feelings or problems experienced by the patient might be an indication of disease or illness and which may bring the patient to a doctor. Pain, shortness of breath, cough, palpitations, bleeding, etc. are examples of the common symptoms, and these are felt or experienced only by the patient. Any particular symptom may be due to a variety of diseases or conditions. A combination of symptoms may provide clues to the attending health professional on the kind of disease or to the organ involved. For example, chest pain, shortness of breath and palpitations in an elderly individual suggests that he/she might have problems in his/her heart.

Because of the disease, some abnormalities may be observed or elicited by the health care professional, in an individual during a clinical examination, and these are known as signs, for example, an abnormal heart or breath sounds, an enlarged liver or an irregular pulse. As in the case of symptoms, a combination of signs are more informative than a single one; hence, the need for a detailed and thorough examination. There are certain problems which can present either as a symptom or as a sign or both. Jaundice, fever and

limb swelling are examples of this. Cancer in any part of the body might give rise to symptoms or signs which are not specific to cancer only, but which may be due to a number of non-cancerous diseases or conditions also. Any long-standing symptom, especially in the elderly, should be brought to the notice of a doctor because of the likelihood of a sinister cause. Chances are that the symptoms may not be due to cancer, but it has been correctly said, 'Ten false alarms are better than one delayed diagnosis'. These signs and symptoms (feelings and observations) are known as *warning signals* and these are as follows:

Change in Bowel or Bladder Habits
This may include a feeling of constipation or diarrhoea in comparison to the past normal habit of bowel evacuation. This may be an early indication of cancer of the bowel.

Similarly, a change in the habit of urination in the form of frequency, thinning of urine stream, retention of urine, bleeding along with urination, are some early signs of cancer of the urinary system.

A Sore that Does not Heal
A sore or wound anywhere in the body which refuses to heal in two weeks time, in spite of treatment, should warn a person that the sore may not be a simple one.

Unusual Bleeding or Discharge from any Source
Bleeding along with stool or urine, with vomits or cough, is a good reason for a complete and thorough medical check-up to find out the exact cause of bleeding. Remember that the amount of bleeding or the frequency of bleeding cannot decide whether the bleeding is or is not because of cancer.

Thickening or Swelling in Breast or Anywhere Else in Body
The appearance of a new swelling or thickening in any part of the body, especially in the female breast, or discharge

from the nipple or change in the shape of the nipple, call for a consultation with a specialist.

Indigestion or Difficulty in Swallowing

Indigestion, pain or uneasiness in the upper part of the abdomen, loss of appetite, nausea or vomiting without any known cause or difficulty in swallowing, are early signals of the possible presence of cancer.

Obvious Change in Wart or Mole

Each one of us has got a wart or mole somewhere on our body, but if any of these show an apparent change from its earlier shape, colour or size in the manner that it becomes rough, starts growing in size or starts bleeding, then consult a specialist to rule out the possibility of cancer.

Nagging Cough or Hoarseness of Voice

Cough, which lingers on for a long time in spite of adequate treatment, should be thoroughly looked into to rule out the cause for alarm. Similarly, hoarseness of voice lasting for more than two weeks should be looked into carefully.

It should be clearly understood that none of the above-mentioned warning signs in itself confirms the diagnosis of cancer in any part of the body. It merely warns the person concerned that if the signal persists for more than two weeks, in spite of proper treatment, then he or she should consult a specialist for clearing any doubts or confirming the disease so that early treatment can be instituted.

3

CLINICAL EXAMINATION AND INVESTIGATION

A patient suspected to have cancer should be subjected to a thorough clinical examination, preferably by a specialist.

The clinical examination pertains to the organ or system suspected to be involved with a cancerous growth. It is carried out to establish the diagnosis, to find out the extent of the disease and feasibility of undertaking the operation. The specialist also examines the body as a whole, system by system, organ by organ, to detect the presence and spread of cancer to other organs or tissues (known as secondaries or metastases). Lymph nodes, lung, liver, spine, long bones, brain are the common sites of secondary deposits. Examination of rectum and vagina by introducing the fingers (digital examination) are mandatory to complete the clinical examination. Clinical examination would also be directed for assessing the fitness of the patient for surgery/radiotherapy/chemotherapy, as individually or as a multi-modality treatment, in which all these forms of treatment are involved.

Ideally speaking, all people should have a thorough medical check-up at least once a year; and this becomes more essential with regard to cancer. Although young age is no bar for development of cancer, the majority of cancerous diseases commonly affect older people. Hence, it is advisable that people above the age of 40 years should undergo a thorough medical check-up at least once a year.

It has already been stressed in the earlier chapter that persons with danger signals must get themselves thoroughly

examined and investigated to rule out the possibility of harbouring cancer.

In addition to medical examination by a competent doctor, every person should learn to examine the accessible parts of his or her body. Self-examination of breasts has been described in the chapter on breast cancer. Lymph nodes—the common sites of which are the neck, armpits (axillae), groin, etc.—should be examined for their presence. Skin, tissue present beneath the skin (subcutaneous tissue), mouth, external genitalia both in males and females, and long bones of extremities are other parts of the body which can be easily palpated (felt) by a person himself or herself. Appearance of any swelling or thickening, alteration of texture and consistency of the part should make the person conscious that he or she should seek the help of a doctor for definite diagnosis.

It should be clearly noted that detection of cancer at an early stage favours complete cure or long recurrence-free period, whereas commencement of treatment in advanced stage of cancer only brings in mutilating operations, higher risks in surgery and short life expectancy.

Diagnosing cancer is a complicated and time-consuming process. However, over the years, advancements in technology with new equipments and techniques have proved helpful in diagnosing cancer. Investigations or tests form an essential and inseparable part of the overall management of cancer patients. At times the patient or the relations may feel that the patient is being unnecessarily harassed or delayed by so many tests, but, this thinking may not be correct as will be made clear by the subsequent paragraphs.

A patient of cancer or one suspected to have cancer will require the following investigations.

To Confirm and to Know the Exact Type of Cancer

This means not only to identify the organ involved but its detailed classification too. This is possible only by

examination of the tissue under the microscope. This process is known as *histopathological examination*. The type of cancer not only indicates the prognosis of the patient but also helps in deciding the type of treatment the patient needs in the post-operative period.

To Know the Extent of Cancer

This involves:

- Extent of the disease in the organ, the spread in the surrounding tissue and whether the spread includes a vital (important) organ or not
- Finding out the distant metastases, i.e. the seedlings of cancer in tissues away from the primary site, as already pointed out in the previous chapter. The common sites for distant metastases are liver, lung, lymph nodes, bones, brain, etc.
- To find out the general health of the patient and evaluate whether he or she will be able to withstand surgery, radiotherapy, chemotherapy—either alone or in combination

This requires assessment of the patient for functional status of liver, heart, kidneys, lungs, etc. If the person is suffering from anaemia, high blood pressure, asthma, diabetes, malnutrition, etc. then the treatment of cancer might be affected. These illnesses have to be controlled adequately before undertaking treatment for cancer. Similarly, any infection in the body, be it of urine or the lungs, should be brought under control or else not only will the treatment of cancer be inhibited but the infection itself is likely to worsen.

The patient is monitored both before the commencement of treatment and during the period of actual management. It may be noted that cancer treatment not only produces complications or deterioration of vital organs (e.g. liver, kidney, heart, lung, bone marrow, digestive tract, etc.), but can lower the general resistance (immune depression) of the cancer patient.

The relevant laboratory investigations for assessment of organ systems are given separately for each affected part.

Liver

- Liver function tests, e.g. serum bilirubin, serum proteins, SGOT, SGPT, alkaline phosphate, etc.
- Ultrasound, CAT scan, MRI of liver
- Liver biopsy by a needle of a suspected abnormal area

Kidney

- Kidney function tests, daily urine output, blood urea, serum creatinine
- Examination of urine for evidence of infection through culture and sensitivity tests
- Kidney scan
- Intravenous pyelography (IVP)

Lungs

- Lung function tests
- Chest X-ray
- Bronchoscopy
- CAT scan

Heart

- ECG

Digestive tract

- Barium meal examination
- Barium enema
- Endoscopic examination of the entire digestive tract by gastro-duodenscopy, sigmoidoscopy and colonoscopy

Bone marrow

- Aspiration of the bone marrow or a needle biopsy examination of the bone marrow
- Bone scan
- X-ray of bone

There are a few special investigations which merit detailed understanding so as to make knowledgable decisions. These are:

Biopsy

This entails examination of the tissue under a microscope by the following methods.

Excision biopsy

The cancerous tissue can be surgically excised either completely or a piece of the tissue can be removed for examination. It is advisable that, if possible, the tumour should be completely removed for biopsy purposes, as in a breast swelling; but in case the tumour is very large or adheres to the surrounding parts, then a piece of the tumour is taken for biopsy purposes. This tissue piece is processed by a complex procedure so as to obtain a microscopic piece over the glass slide. This piece is stained by different methods, depending upon the need, and then the slide is examined under the microscope, which can give a magnification upto 250,000 times. In this manner, each individual cell unit of the tissue can be examined in great detail. The whole procedure of biopsy examination takes at least 48 hours; but, with the frozen technique, it is possible to give tissue diagnosis in five to ten minutes.

Biopsy examination reveals:

- type and sub-type of the tumour and the stage of growth
- invasion by the tumour cells of the blood vessels and lymphatic channels—a positive sign indicating advanced stage of cancer and hence, a poor prognosis

Cytological Examination

This is a quick and reliable technique for diagnosing cancer. Because of its simplicity, rapidity, reliability and inexpensive nature, this has also become one of the most commonly used techniques for mass screening of patients in certain types of cancer. As mentioned earlier, cancer cells are morphologically

different from their counterparts, and cytological examination is based upon the study of cells from the tissues. These cells can be obtained for study from:

- secretions like sputum, urine, gastric juice, fluids from peritoneal and pleural cavities
- the surface of the tissues by scraping. This scraping can be directly obtained as in cancer of the mouth, skin, uterine cervix, etc. or through an endoscope as from oesophagus, stomach, urinary bladder, large bowel, etc.
- the depth of the tumour by fine needle aspiration as from breast, lymph nodes, thyroid, bone, liver, intestines, muscle, etc. known as FNAC

Cytological examination can be carried out as an outpatient procedure even with little facilities in a modest clinic; hence, it is acquiring more and more popularity.

Endoscopy

Endoscopic examination permits direct visualisation of the insides of organs and tubes which otherwise remain hidden from the examining fingers, till they become large in size. Fibre-optic endoscopes have practically replaced the metallic rigid scopes, and with the help of these fibre-optic endoscopes it is possible for an experienced endoscopist to visualise every nook and corner of a hollow organ or tube. A very small-sized abnormality in the inner lining of the organ can be detected. Endoscopy is used for visualisation of the throat, bile passages, oesophagus (food-pipe), stomach and duodenum, rectum and colon (large intestine), urinary bladder, abdominal and chest cavity, etc. Through the endoscope, it is also possible to obtain a piece of suspicious tissue for biopsy examination.

X-rays

Radiology plays an important role in the overall investigative protocol of a patient. The specific radiological investigation in relation to a specific organ will be described in the

respective chapters. However, the general description of radiological procedures undertaken for detection of either a primary lesion or distant metastases are discussed herewith.

Chest X-ray

It can reveal malignancy in the lung with secondary deposits, either in the lungs or lymph nodes in the chest. Presence of fluid in the pleural cavity (space between the lung and chest wall) denotes a late stage of cancer.

Barium studies

Barium is a radio-opaque material and is used to outline the affected part and aid its visualisation. To find out the abnormalities in the upper part of the intestinal tract (oesophagus, stomach and small intestine) barium is given by mouth and its progress is seen on a television screen (known as screening), whereas to see the large intestine, barium is given in the form of an enema through the rectum.

Pyelography

This procedure is undertaken to visualise the urinary tract by giving intravenously a radio-opaque dye (which is excreted by the kidneys) to visualise the kidneys, ureters and urinary bladder. This is known as descending or intravenous pyelography (IVP).

In ascending or retrograde pyelography, a small tube is passed in the ureter, dye is injected and X-rays taken to visualise the kidney on a particular side only.

PTC (percutaneous transhepatic cholangiography)

This procedure is used in patients with jaundice. The bile channels in the liver get dilated subsequent to obstruction in the passage of bile to the intestine. A fine needle is inserted in the liver in an attempt to hit a dilated bile channel and when it is done, then radio-opaque dye is injected; this visualises the bile channels and demonstrates the site and nature of obstruction.

ERCP (endoscopic retrograde cholangio-pancreticography)
Through an endoscope, a canula is passed into the terminal part of the bile duct via its opening in the duodenum. Subsequently, the radio-opaque dye is injected which visualises the bile duct as also the pancreatic duct. This procedure is helpful in identifying diseases of liver, bile duct, pancreas and duodenum.

Ultrasound
Light frequency sound ranging from 2.5 MHZ to 10 MHZ is used in diagnostic ultrasonography. When sound passes through the tissues, sound-tissue interaction takes place to produce echoes of variable intensities. These echoes are compiled, analysed and displayed with the aid of sophisticated electronic equipment and computers. The image displayed represents the specific echo texture of an organ or tissue. Any change in this echo texture is indicative of disease, thus helping the medical personnel to determine the site and probable nature of lesion in patients suspected of having tumour or proved to have a tumour. The original organ, the extent of tumour invasion and response to treatment are assessed by ultrasonography. There is no radiation involved; hence, repeated examinations are possible. This is much cheaper than the high-tech investigations that will be mentioned later on.

The exact nature of the tumour, however, cannot always be established by ultrasound but, when ultrasonography is combined with needle aspiration (FNAC), then the diagnostic accuracy is 95 per cent. There are, however, some physical limitations. Due to presence of excessive gas, bone (brain of adults cannot be examined by ultrasound), excessive fat, etc., CT scan (described below) or MRI scan may be of greater help than ultrasonography.

CT Scanning
In 1972 Prof. Godfrey Hounsfield alongwith physicist Allan Cormack devised a revolutionary technique of diagnostic radiology, known as *computed tomographic scanning* (CT scan).

The impact and importance of this method can be gauged from the fact that both these scientists were awarded jointly the Nobel Prize for medicine and physiology in 1979.

In CT scan, images are seen in a cross-sectional format, which avoids the confusing superimposition of organs inherent in two-dimensional imaging with conventional radiographic techniques using X-ray films. CT scan records accurately small variations in tissue density, facilitating demonstration of fluid, fat and calcium within the diseased area. A tumour as small as 3 mm can be detected by CT scan. However, as the radiation burden can become significant, a judicious use of this diagnostic procedure is essential.

MRI (magnetic resonance imaging)

Magnetic resonance imaging is the latest breakthrough in diagnostic imaging and has the maximum diagnostic potential. This method utilises radio-frequency signals emitted by atomic nuclei in a magnetic field. The atoms generating the signals are the natural atoms which make up the body tissues. MRI has many advantages over CT scan. It does not require X-ray and pictures can be obtained from different angles (multiplanar imaging), thus enhancing the diagnostic capabilities of the method. The contrast between two different tissues is far superior than possible by CT scan, thus giving a much clearer picture. MRI is also advantageous because it is possible to obtain images directly in two planes at right angles to each other. It does not involve ionising radiation; hence, repetitive studies are safely possible. The MRI technique also allows direct analysis of the metabolic function, which is an important breakthrough in the diagnosis of a disease. MRI is considered better than CT scan for visualising the central nervous system, bones and joints.

Mammography

Mammography is a modified X-ray examination of the breasts for detection of tumour before it becomes a palpable mass or produces other symptoms, as well as for further

evaluation of a breast lump. There is a misguided fear that mammography is a painful procedure, whereas the fact is that in capable hands, it causes no more than a little discomfort. Mammography gives a detailed view of the tissues of the breast and is useful in picking up small tumours that might otherwise go undetected for some time and may present in an advanced stage, thus making it more resistant to treatment. In patients with obvious breast lumps, mammography gives a better characterisation of the lump, which can help in differentiating a cancerous from a non-cancerous (benign) tumour. It also detects other lumps or deposits in and around the primary cancerous growth in the same breast and in the other breast, which may affect the treatment regime employed and the ultimate prognosis. In case a suspicious mass is seen on mammography, then biopsy should be performed, and this is done by a stereotactic device.

In developed countries like USA, UK, etc., every woman above the age of 50 years undergoes mammography screening once in two years to detect breast cancer at the earliest possible stage. But in India, it has not yet become a routine procedure, particularly because of financial constraints and also because breast cancer is not as common as in Western countries. But, all women with increased risk factors for development of breast cancer should get mammography done regularly, the details of which are given in the chapter on breast cancer.

4

TREATMENT AND MANAGEMENT

It is important to remember the following three facts while reviewing the treatment options for cancer:

- Biopsy or microscopic examination of the suspicious tissue is the only confirmatory test to diagnose cancer
- Earlier the treatment started, better is the prognosis. As mentioned earlier, cancer can be cured in 75 to 80 per cent of cases if treated at an early stage, whereas in advanced stages the results are very poor
- There is no magic or secret treatment available for cancer, and hence, it is important not to waste time, energy, and of course, money in trying out unproven, unscientific methods

In the treatment of a cancer patient, the aim should be to cure the patient, i.e. bring about complete eradication of the disease. Unfortunately, this is not possible in a large percentage of patients, firstly, because of the biological behaviour of the disease process and secondly, due to the advanced stage of the disease. Under these circumstances, the aim is to control the disease, i.e. to arrest the progress of the disease process and make the patient as comfortable as possible. This is known as *palliative treatment* for the patient.

To obtain complete cure or palliative control of the disease, various modes of treatment are available, the important ones being:

- Surgery
- Radiotherapy

- Chemotherapy
- Hormone therapy
- Immunotherapy

Any one of these may be utilised for the management of a cancer patient, either alone or in combination with others. These combinations can be of various types and forms, the treatment involving utilisation of services of varied specialities and specialists. It has been recently realised that a multi-modality management, involving the above-mentioned forms of treatment, offers a much better prospect to the patients than single modality of treatment.

Ideally, strategic planning of treatment of an individual cancer patient must be made by specialists of several disciplines so that a balanced management for imparting a complete cure, or at least for practical, safe, effective, long-lasting and acceptable relief, with minimal side effects and complications is possible. Various specialists in the management include a surgeon, physician, paediatrician, pathologist, cytologist, oncologist, radiotherapist, radiologist, rehabilitation expert, psychologist, social worker, etc.

Surgery

This is the oldest, the most popular and the most reliable mode of treatment. When the cancerous tumour is localised, i.e. it has not invaded the neighbouring areas and its cells have not got lodged at distant organs or lymph nodes, then the tumour is completely excised and one can hope for complete cure (Fig.4).

The principle of surgery involves removal of the tumour along with 2 to 5 cms wide normal tissue all around. This tumour should be removed along with its blood supply and the draining lymph nodes. An attempt is made to do this *excision en bloc*, i.e. the tumour is removed as a whole and not in pieces, or without cutting through the tumour tissue.

In a *locally advanced stage* when the cancer cells invade the surrounding structures, the tumour can be removed

Fig. 4: Localised tumour; area included by the interrupted line, if excised, may result in a cure.

surgically alongwith the adjacent tissue, with the hope of a good result. Under these circumstances at times the surgeon may decide to back out without removing the tumour or may remove a part of the tumour (*partial* or *subtotal excision* or debulking) and leave behind the rest of it (Fig. 5). This

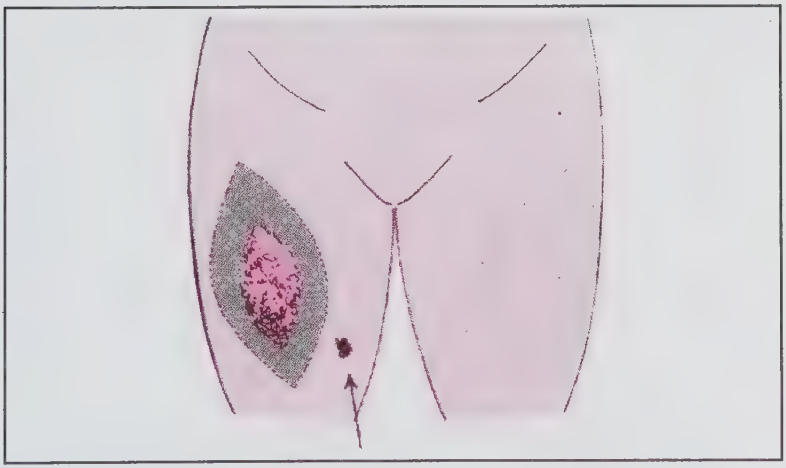


Fig. 5: Tumour with cancer cells lying away from the main tumour mass. Area included by the interrupted line, if excised, removes the main tumour mass but the left-over cancer cells soon result in the formation of a new tumour.

left-over part of the tumour can be dealt with by subsequent radiotherapy and/or chemotherapy. The extent and nature of the partial excision of the tumour depends upon the type of tumour, its neighbouring structures, the problems produced by the tumour and other features.

In a more advanced stage when the tumour has extensively invaded the surrounding structures (particularly an important or vital organ) or has already got distant seedlings, then it may become very difficult or futile to remove the tumour (Fig.6). Under these circumstances, if the tumour is producing obstruction or bleeding or severe pain, then an operation known as *palliative* operation can be performed to give relief to the patient.

The surgeon dealing with a cancer patient is frequently confronted with a situation when he has to decide whether to go in for a major radical operation or adopt conservative measures. This is of importance when we realise that major surgical operations, particularly for cancer, may lead to a higher percentage of complications without achieving a cure or without prolonging the life span. It has also been realised lately that a conservative operation may give as good results

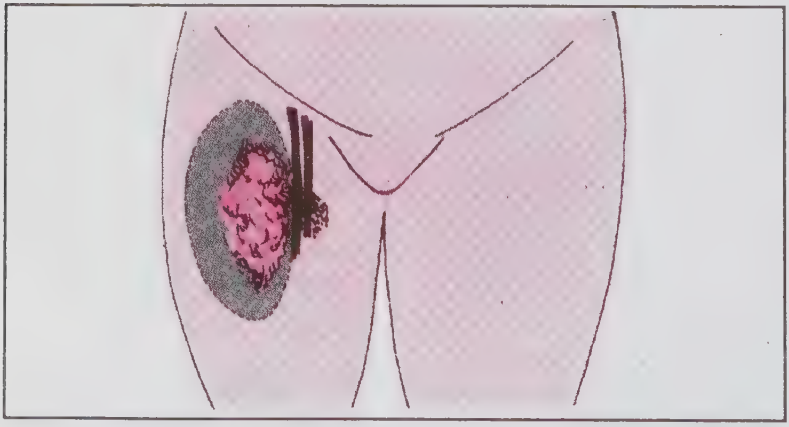


Fig. 6 a: Tumour adhering to vital (important) organs. Complete excision of the tumour is not feasible. Area included by the interrupted line is excised to give palliative resection.

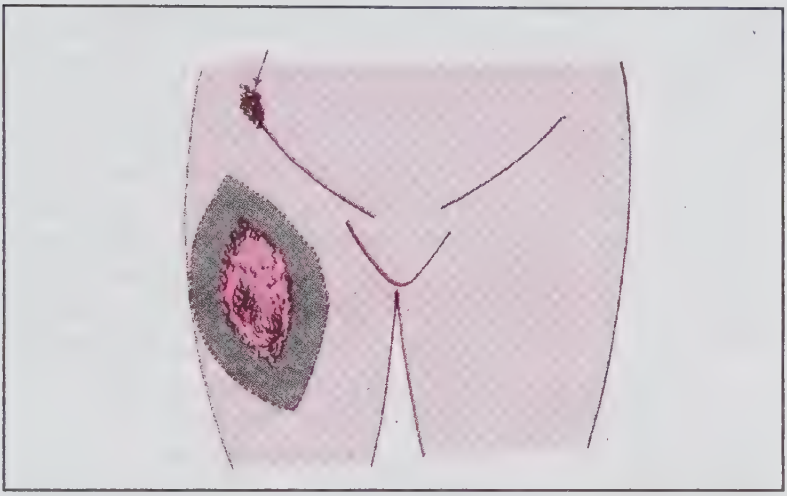


Fig. 6 b: Tumour can be excised but metastasis is already present in the lymph nodes.

as a more radical and mutilating operation; take, for example, the case of breast cancer where removal of only a part of the breast (*breast conservation surgery*) gives as satisfactory results as total removal of the entire breast alongwith the underlying muscles (*radical mastectomy*).

Radiotherapy

Application of various forms of ionising radiation is suitable for the management of cancer and this is known as *radiotherapy*.

A large number of patients are given radiotherapy alongwith surgical treatment so that in case some cancer cells have been left behind following surgery, then these can be destroyed.

Radiotherapy plays a dominant role in the management of all kinds of cancer. It is a technology whereby cancer cells can be selectively destroyed by ionising radiation emitted from natural radioactive sources, such as cobalt or iridium or by artificially produced X-rays as in the linear accelerator. The relative dose required to eradicate a tumour

completely and permanently depends upon the radiation tolerance of the nearby structures.

When the tumour can be destroyed completely with lower dose ranges, the tumours are said to be highly *radiosensitive*, as is the case in Hodgkin's disease, lymphomas, seminomas and dysgerminomas. An important advantage of radiation therapy is organ preservation as seen in the head and neck, anal canal cancer or sarcomas in the limbs. Radiation therapy plays a key role in treatment of cancer of the lymph nodes, the larynx, tongue, cheek, lip, skin and uterine cervix. A high percentage of cure is seen in these cases and also helps in preserving the normal functions as well. Cancer of oesophagus or of rectum or in advanced cancers of hypopharynx and maxilla, treatment with radiation makes the inoperable tumours operable again. Radiation therapy is frequently used post-operatively for sterilising the microscopic disease after surgery in cancer of breast and of neck. With the availability of technologically advanced equipment of radiotherapy and better understanding, major side-effects of radiation are avoidable and minor ones controlled effectively with medical treatment. Radiotherapy is also given to the tumours which are not fit for surgery or are in an inaccessible location. It can also be given to secondary deposits which cannot be removed surgically due to technical/medical reasons.

The dosage of radiation to be delivered to any tumour is determined by the radiation tolerance of the normal tissues adjacent to the tumour. For example, when radiation is given to a bunch of lymph nodes in the abdomen, the adjoining normal tissues of the intestine, liver, kidney, etc. also receive the radiation, and this limits the use of radiation in a higher dose. Due to injury of normal organs or tissues, radiotherapy may prove fatal or may become unacceptable as it may produce severe problems in the liver, lung, brain, spinal cord, heart, kidneys, intestines and the bone narrow. Radiotherapy to the pelvis can lead to sterility, both in men and women.

Besides affecting the adjoining normal tissues, radiation may lead to deterioration in the general condition of the patient, causing destruction of blood cells, particularly when radiotherapy is given to a large field. Hence, strict monitoring of the overall condition of the patient receiving radiotherapy becomes essential. Radiotherapy can also produce *immuno-depression* in the recipient, making the patient more susceptible to infection. The difference between the dose of radiation required for control of cancer and the dose tolerated by normal tissues without complications determines the extent of the cure of the disease.

The type and severity of complications seen after radiation therapy will depend on many factors, including the volume of tissues treated, areas treated, total dosage and fractionalisation of the radiation. One method of improving the therapeutic response to radiation is by dividing the total dose of radiation into multiple doses or fractions. The latest improved techniques in radiotherapy have not only improved the overall success rate but also diminished the complication rate too. This has also become possible because of the modern radiotherapy equipments which not only direct the beam of radiation exactly to the indexed area but also spare the surrounding tissues from the radiation. Use of computer for precise delivery of radiation is another welcome addition.

Uses of Radiation Therapy

Radiation therapy may be employed as:

- the sole mode of treatment for the cure of a number of forms of cancer
- an alternative to surgery with comparable cure rates
- the only feasible form of treatment either because of the type of tumour or general condition of the patient
- an adjuvant to surgery. Surgery is highly effective in removal of macroscopic or an easily recognisable tumour but may fail in dealing with the microscopic spread. This can be taken care by radiation therapy

Care of the patient receiving radiation therapy involves provision of emotional support and medical management of the symptoms, arising both from the illness and treatment. It is essential to give special attention to hydration and nutrition in patients receiving radiotherapy. These patients may suffer from nausea, vomiting, loss of appetite, for which it becomes necessary to give a proper nourishing diet comprising semi-solid and easily-digestible food materials of high caloric value. The meals should be given in small quantities, but more frequently.

A common misconception among patients receiving radiation therapy is that they or their personal belongings will become radioactive as a result of the treatment; this is, however, not true.

Chemotherapy

Treatment by chemical agents or drugs is known as chemotherapy, and can be given either alone or in combination with surgery and/or radiotherapy. Chemotherapy has become a major form of treatment in various types of cancer. Both long-term remissions and complete cures have been achieved in certain types of cancer, like acute leukaemia and Hodgkin's disease, cancer in children, etc. Long-term good results following use of chemotherapy have been noted in cases of cancer of oesophagus, of breast and of small cells of the lung.

All chemotherapeutic agents not only affect the cancer cells but the normal cells too, producing side-effects of chemotherapy. These side-effects are limiting factors in the administration of chemotherapeutic drugs. Normal cells which divide rapidly, such as those of digestive tract, skin surface and bone marrow, are usually more sensitive to the action of chemotherapeutic agents, and are commonly affected at the time of their administration. The dose of the anti-cancer agent is adjusted so as to obtain a balance between the maximum possible therapeutic effect against the tumour and the least possible toxicity to other tissues of the host.

Because of the varied biological behaviour of cancer, no chemotherapeutic agent has yet been found that is cent percent effective, not even on the same type of cancer. Vast research has been going on to find newer and better chemotherapeutic agents, which will not only act more effectively on a particular type of cancer but also have less toxic effects.

Hormone Therapy

It has been known since a long time, for almost a century, that certain tumours are hormone dependent and hence, removal of that particular hormone-producing agent or tissue or addition of the opposite hormone may produce palliation with minimal morbidity. Such hormone-dependent tumours are seen in the breast, prostate, thyroid, uterus, etc.

5

COMMON SITES AND TYPES OF CANCER

In all, 285 types of cancer have been identified so far. Cancer can affect any part or tissue of the human body but a few sites are more commonly involved than others (Fig. 7).

- Skin
- Oral cavity—tongue, mouth, larynx, etc.
- Digestive tract—oesophagus (food-pipe), stomach, intestine, rectum, anal canal
- Lungs
- Breast cancer
- Urinary system—kidney and bladder
- Genital organs—testes, prostate and penis in male; ovary, cervix and uterus in female
- Muscles and soft tissues—nerves, blood vessels, fibrous tissues, etc.
- Childhood cancer—involve blood (leukaemia), nervous system, eye, brain, etc.
- Bone tumours

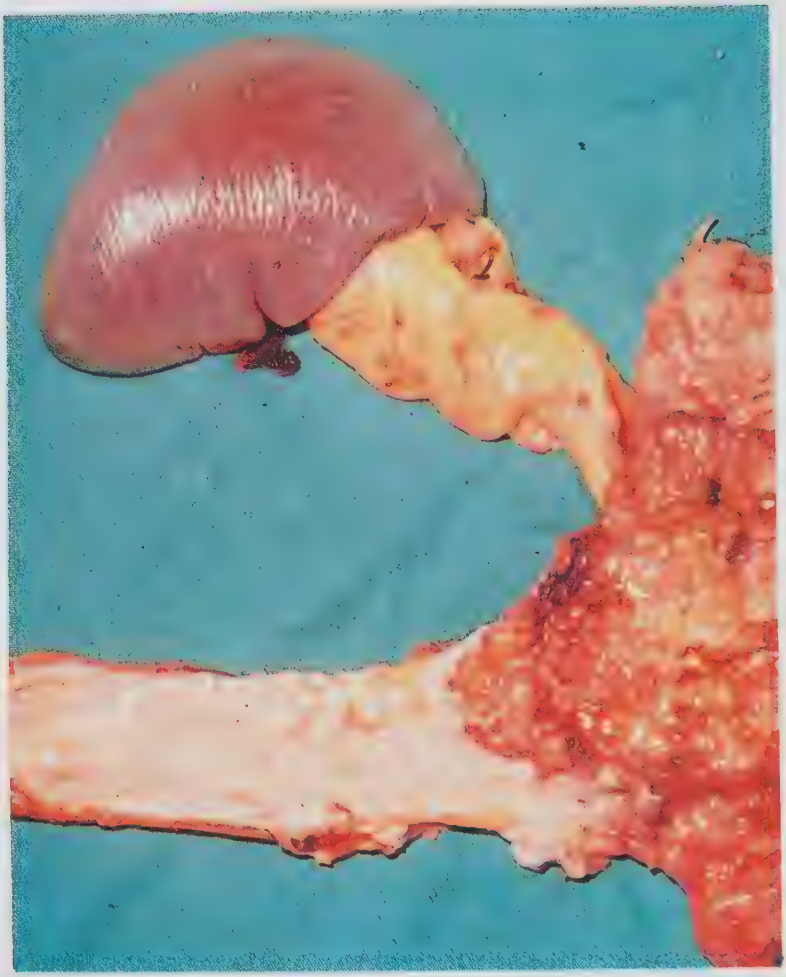
Skin Cancer

Skin cancer is one of the most prevalent forms of cancer, but fortunately, it also happens to be one of the most curable forms of the disease. More than 90 per cent of patients with skin cancer are cured and it is believed that if all patients seek medical help at an early stage, then the percentage of cured cases can be still higher.

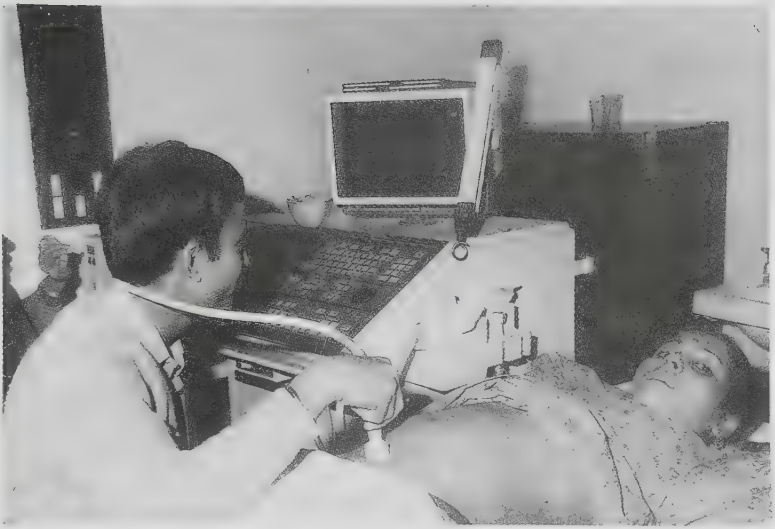
The skin because of its large surface area is the largest organ of the body. Because of its external location and

Malignant melanoma: a dangerous form of skin cancer. Note the black characteristic colouration.

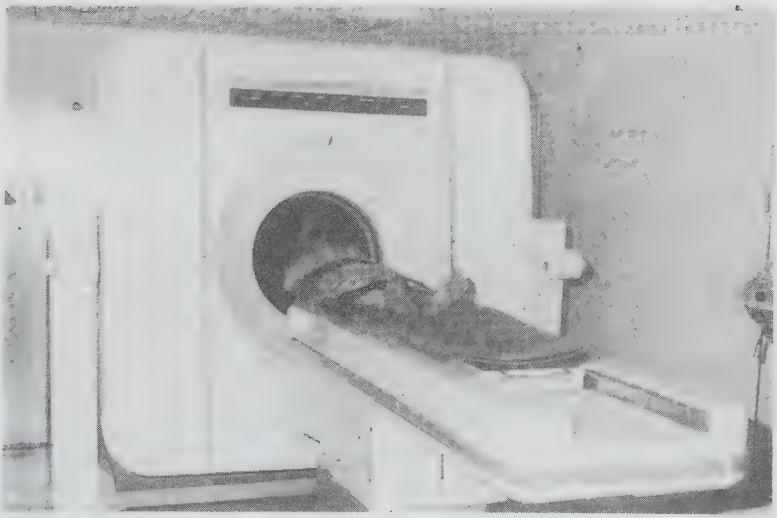
Breast cancer fixed to the underlying muscles—locally advanced cancer.



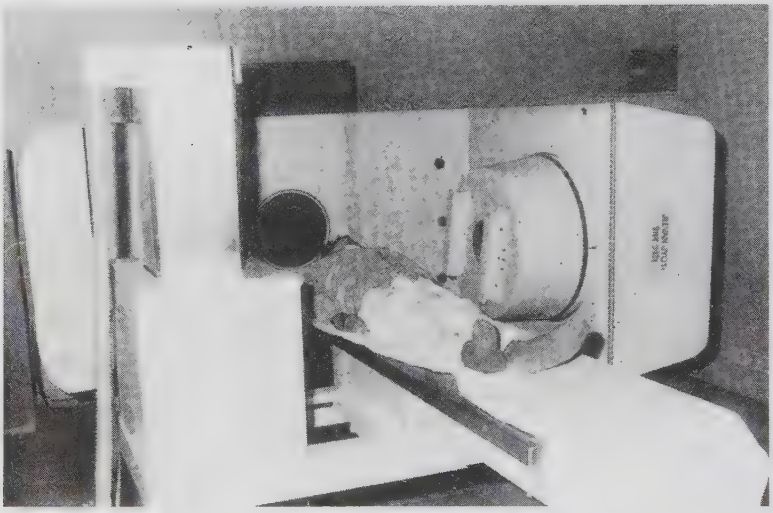
Cancer seen at the junction of the oesophagus and the stomach. Whole of oesophagus, part of stomach and spleen were removed at the time of operation.



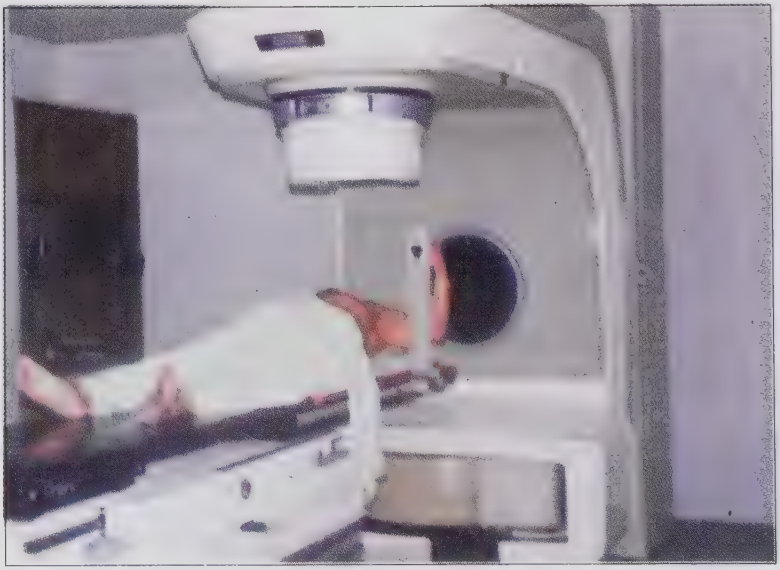
Ultrasonographic scanning of the abdomen.



CT scanning being performed.



Linear accelerator: radiotherapy equipment in use.



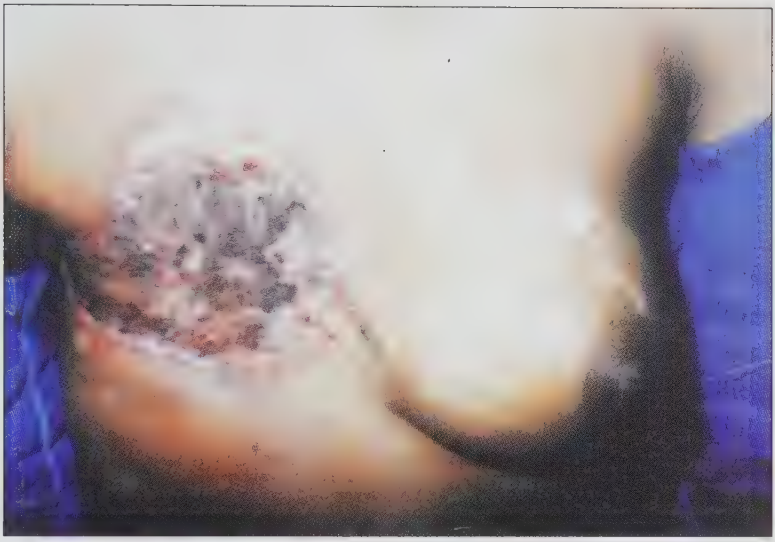
Patient being given radiotherapy.

Cancer of the stomach.

Breast conservation surgery for breast cancer. Good cosmetic results.

Total breast removal for cancer. Cosmetic result is not satisfactory to the patient.

Bleeding from nipple, a warning signal for breast cancer.



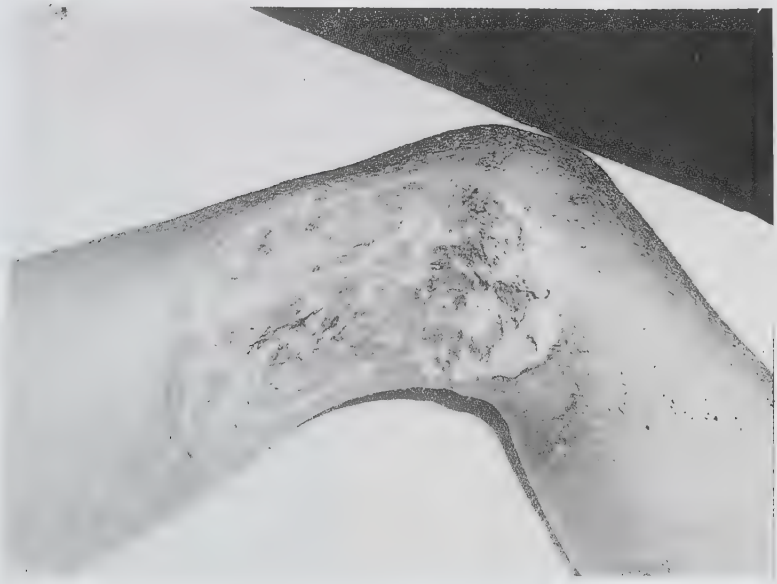
Operated case of late stage of breast cancer. The physical mutilation is obvious.

Cancer of thyroid with metastasis in the skull.

Ultrasound examination of abdomen underway.

MRI in progress.

Soft tissue cancer (fibrosarcoma) above the knee.



After surgical removal and skin grafting.

Distant metastases—secondaries in the neck due to cancer of the tongue.

Skin cancer of the thumb.

Tumour of eye—retinoblastoma in a child.

Skin cancer of the lip, due to tobacco chewing.

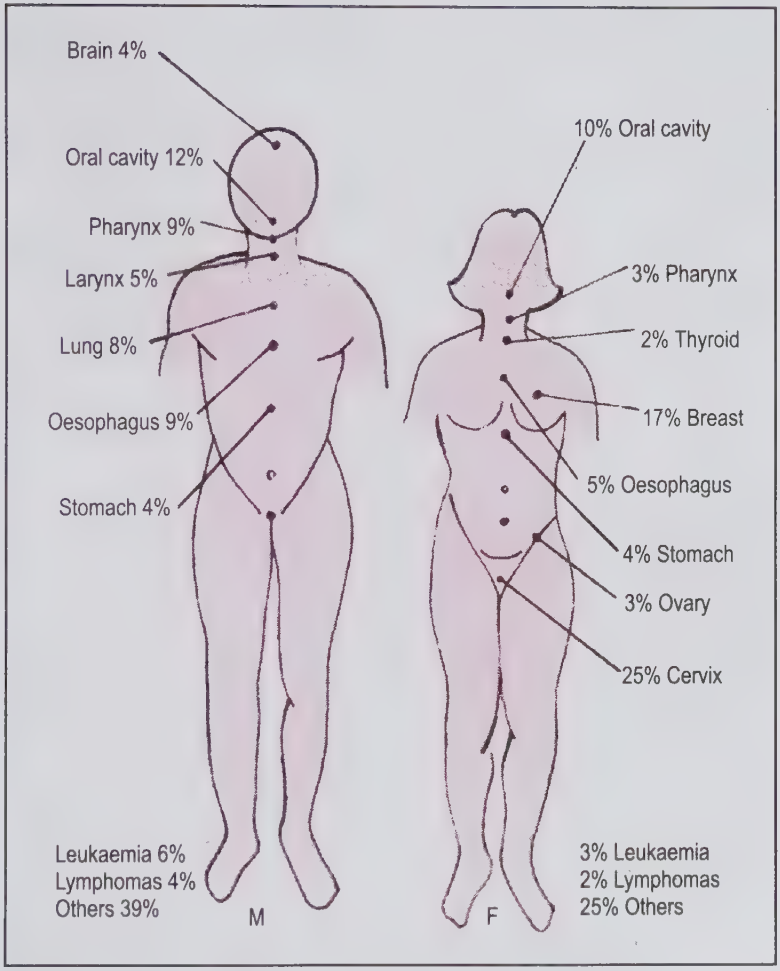


Fig. 7: Incidence of common types of cancer in India.

multifarious activities, the skin is constantly subjected to injury by infectious and irritative agents, like the sun's rays, resulting in cellular abnormalities, as in the skin.

Certain abnormal skin conditions may give rise to cancer over a prolonged period of time if the stimulus in the form of an irritant continues. The most common pre-cancerous condition is keratosis. Keratosis is skin-thickening which usually develops in an exposed part of the body, the

commonest site being the face or the hand. As cancer is due to persistent irritation, keratosis usually develops in older persons when the skin has been exposed to sunlight for years. The other known irritants are coal tar, arsenic, silver and mercury compounds, radium and X-rays.

It is therefore clear that farmers, sailors, and other persons who are greatly exposed to direct sunlight, and those handling dyes, coal tar and other chemical agents, are more prone to develop skin cancer. They should, therefore, take adequate precautions, like wear sun hats, long-sleeved shirts, gloves, etc. Precautions against radiations are generally well known.

Diagnosis

Almost any part of the skin can be affected by cancer, particularly the exposed parts, like the face, neck, forearms and the back of the hands being the most common sites. The disease appears as a dry, scaly patch or pimple which persists, or an inflamed area with a crusting centre, or as a pale, waxy, early nodule which may eventually ulcerate. All these refuse to heal with the normal forms of treatment.

Malignant melanoma, a relatively uncommon cancer of the skin, is a more dangerous form, occurring usually as a dark brown or black, small mole-like growth, which becomes larger, may get ulcerated and bleed. It can arise from a pre-existing mole, although some melanomas may arise *de novo*.

The disease can be suspected on clinical examination by a doctor, but the final diagnosis is established only after the tissue has been examined under a microscope.

Early signs of skin cancer include loss of skin markings, variegation in pigmentation and irregular thickening of skin.

Late signs include roughened area of skin that scabs, rescabs and fails to heal with usual treatment; persistent ulcer, not explained by any other cause (e.g. diabetes mellitus, varicose veins, tuberculosis, etc.); development of ulcer at a site of previous irridation, old thermal burn or unstable scar of long duration; and suspicious skin lesion in high risk

patients, i.e. patients continuously exposed to irritants like sunlight, chemicals, etc. for a long time.

Treatment

Cancer of skin can be successfully treated either by surgery or radiotherapy, and in some cases a combination of the two forms of therapy can be employed for better results. Radiotherapy is usually not used if the cancerous growth has spread to the underlying bone. In advanced cases, chemotherapeutic drugs can be given.

Cancer of Oral Cavity

In our country, cancer of oral cavity takes the largest share in the overall incidence of cancer in males and is one of the commonest causes in females too. The obvious reason being the common habit of chewing tobacco, which is commonly prevalent all over the country. This habit is not so common in the states of northern India; therefore, the incidence of cancer of oral cavity is relatively less in this area but is very common in Uttar Pradesh, Bihar, Andhra Pradesh, Madhya Pradesh, etc. The habit of keeping a bolus of tobacco in the mouth (*gutka*) for a very long time causes constant irritation to the inner lining of the cheeks, gums and tongue, and this habit is worse than swallowing tobacco.

The habit of consuming *Pan Masala* is flaring up like wildfire and researchers have conclusively shown that prolonged use of *Pan Masala* may cause cancer.

The most common sites of cancer of the mouth and oral cavity are the floor of the mouth, the pharynx including the soft palate, the lips and the tongue. Other sites may include the salivary glands, the gums or gingivae, the hard palate or roof of the mouth, the buccal mucosa or soft tissues inside the cheek.

Cancer of Tongue

Cancer of tongue commonly begins at the two free margins or at the tip. It usually starts as an ulcer (wound) which may

be very small to start with but gradually develops in size. If one feels this ulcer with the tips of the fingers, then its base (floor) feels hard as compared to other areas of the tongue.

Cancer of tongue metastasises to the neighbouring lymph nodes of the neck in no time. A large percentage of patients usually have positive lymph node metastases when they go to a doctor for initial consultation. Any ulcer of the tongue which refuses to respond to standard treatment in about two weeks time is suspected to be cancerous, particularly so in a patient above the age of 40 years, and FNAC or biopsy is advisable for establishing the correct diagnosis.

Cancer of tongue is sensitive to radiotherapy and needs no mutilating surgery. The cancerous lesion is treated by radiotherapy, either by implanting radium needles (the process is called *interstitial irradiation*) or by external beam radiation. The left-over lymph nodes in the neck are removed by operation (*block dissection of neck*). But if the disease is very advanced, say, for example, the cancerous tumour has spread into the jaw bones, then radiotherapy is advised and the tumour along with the regional lymph nodes is surgically removed. There may be some after-effects from radiation therapy, such as pain on swallowing and chewing or loss of the sense of taste and smell; hence, some radiologists prefer split-dose radiation therapy, that is, giving the treatment first and then waiting for some time before giving the second dose.

Cancer of Floor of Mouth and Inner Side of Cheek

These are quite common sites for development of cancer in India, again because of the common habit of chewing tobacco. The initial symptoms are not so obvious and hence are normally neglected; but the disease keeps on progressing gradually. Pain, swelling, ulceration (wound), difficulty in eating and speaking are the initial problems seen and felt by the patient.

Diagnosis is established by taking a biopsy piece for

examination under the microscope.

Treatment is either by surgery or radiotherapy. Surgical treatment of cancer in and around the mouth, may sometimes result in facial disfigurement for which reconstructive surgery is undertaken.

Cancer of Larynx

This is another form of cancer, which is very common among males, particularly cigarette smokers who are more prone to it than those habituated to cigar or *bidi*. It is felt that alongwith tobacco, tars and alcohol also play an important role in the causation of carcinoma of larynx. The larynx is involved in phonation and respiration, and any tumour in this location affects their functions. Hoarseness of voice is usually the first symptom and may gradually progress to aphonia. Respiratory obstruction is seen subsequently and may be dangerous for the patient. Hoarseness of voice is thus included as a warning signal and any patient who has persistent hoarseness, for more than two or three weeks despite treatment, should get a careful inspection of the throat by an ENT (ear, nose and throat) specialist to rule out the presence of cancer of the larynx.

Radiotherapy is the treatment of choice in early cancer of larynx when the disease is localised; however, surgery has to be undertaken in advanced cases. Surgery involves removal of the larynx, as a result of which the normal voice is lost. Half of these operated patients can learn to use effective oesophageal speech, which can be learnt with the help of a speech therapist. This effective oesophageal speech enables the person to communicate understandably, even with strangers and casual acquaintances. An additional 25 per cent can make themselves understood to members of their family only. Nearly 50 per cent of patients who are partly or completely unable to learn oesophageal speech can use electro-vibrating devices to communicate fairly reasonably with others.

Cancer of Digestive Tract

Cancer of digestive or gastro-intestinal tract is a common disease among elderly people and is quite common in India (Fig. 8). The tumour is usually located in the upper part of the gastro-intestinal tract, i.e. the oral cavity, oesophagus (food-pipe) and stomach or in the lower parts, the colon (large intestine), rectum and anal canal. The middle part of the intestinal tract, i.e. the small intestine, is not a common sight for the growth of cancer.

The overall result or outcome, even following treatment,

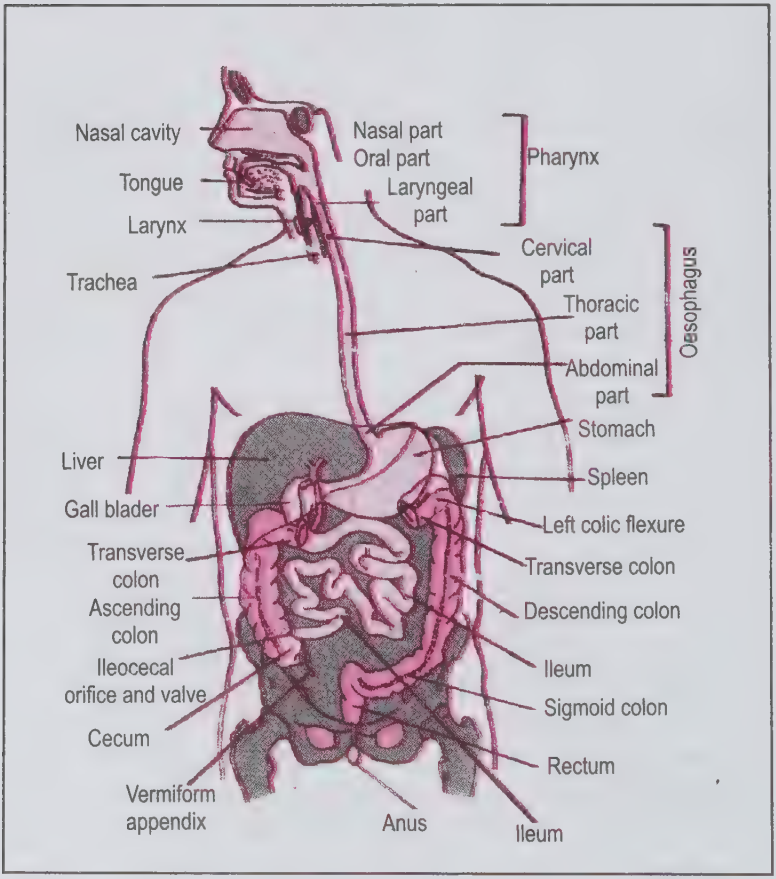


Fig. 8: Diagram of the digestive tract.

is much poorer in cancer of oesophagus and stomach as compared to cancers of colon and rectum.

Cancer of Oesophagus

In India, the oesophagus is one of the commonest sites for the development of cancer, particularly so in males. As per the Indian Cancer Registry, it is one of the most common sites for tumours. Although any part of the oesophagus may be involved, it is the lower one-third of the food-pipe which is diseased; statistically 50 per cent of all oesophageal cancers are located at its junction with the stomach.

The earliest and constant feature of oesophageal cancer is difficulty in swallowing, which progressively increases, beginning with difficulty in swallowing solids, then semi-solids and gradually liquids; finally the patient is unable to swallow even his own saliva. This evidently leads to poor nutrition; the patient starts losing weight rapidly. Because of difficulty in passage of food material or water down the oesophagus, the patient is more prone to regurgitate food from the oesophagus to the respiratory tract, thereby getting infection of lungs (aspiration pneumonia). Blood in sputum is an uncommon feature of malignant tumour of oesophagus.

Investigations

Radiological examination of oesophagus by barium test (known as *barium swallow*) is the commonest form of investigation for the diagnosis of oesophageal tumour.

Endoscopy is another common procedure to examine the oesophagus. One can use the endoscope to visualise the entire oesophagus and also take a piece of the tissue under vision for pathological examination, to establish the diagnosis. Chest X-ray and CT scan examination may also be conducted to find out the stage of the disease.

Treatment

Surgical management is the mainstay of treatment. The involved part of the oesophagus is removed and continuity

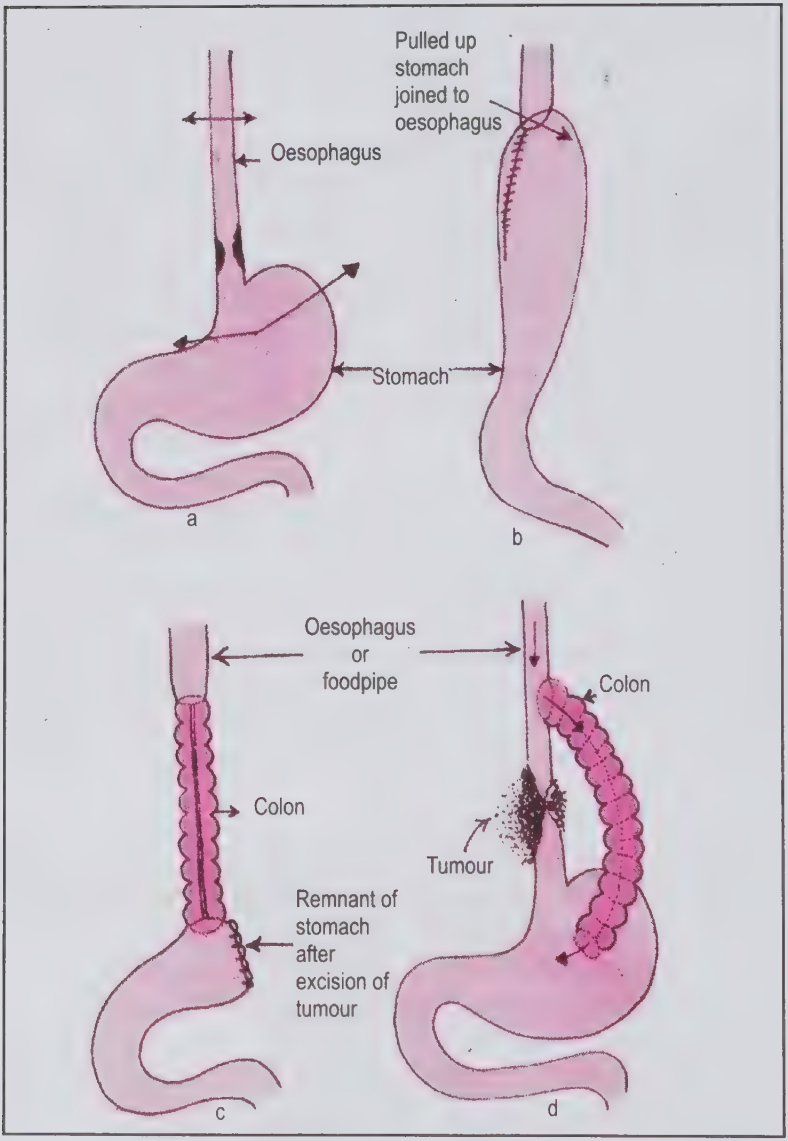


Fig. 9 a: Area of excision for cancer of oesophagus. b: After excision, the stomach is pulled up and joined with the left-over oesophagus. c: The gap can also be bridged by a segment of the large intestine—colon. d: Inoperable cancer of the oesophagus: palliative colon bypass done so that the patient is able to swallow.

restored either by advancing the stomach upwards or by interposing the large bowel (colon) between the remaining part of the oesophagus and the stomach. As the oesophagus is present in the chest cavity, its operation is undertaken only in a few specialised centres. The involved part of the oesophagus is removed by opening both the chest and the abdomen. But, of late, a number of surgeons prefer to remove the entire length of the oesophagus through the abdominal route only, and this *transhiatal oesophagectomy* is supposed to be associated with less complications, particularly the chest infection (Fig. 9).

Oesophageal cancer is usually radiosensitive, i.e. it responds to radiation. Radiotherapy can be used alone as a radical treatment modality or it can be combined with surgery. Recently, newer chemotherapeutic agents have shown good results in treatment of the cancer of oesophagus. Drugs for treatment can be used alone or in combination with surgery and/or radiotherapy. The drugs that have been found useful are Cisplatinum, Bleomycin and Vincristine. The present trend is to give chemotherapy and/or radiotherapy first and then follow it up with surgery, but the sequencing may vary, depending upon the stage of the disease and the choice by the treating surgeon.

Palliative Treatment

Under the circumstances when the disease is in advanced stage or when the patient is not in a fit state for major surgery, one has to give up the idea of cure. One can only offer palliative measures to improve the quality of life. The following procedures are commonly used:

- Radiotherapy and/or chemotherapy as has been mentioned above
- Bypass operation, when the tumour cannot be removed by operation because of its advanced stage. The oesophagus is bypassed to make an alternative passage for the flow of food material. This is done either by interposing a segment of the large intestine or by

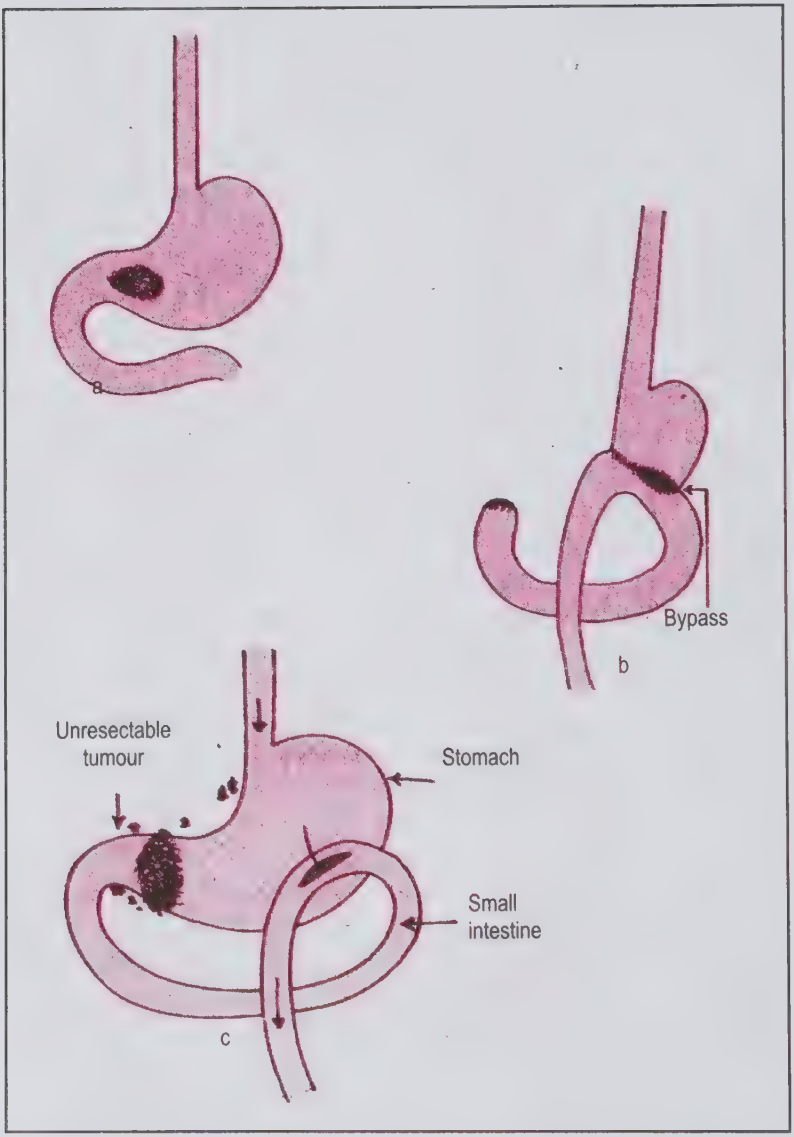


Fig. 10 a: Cancer of the stomach; levels of excision. b: After excision (subtotal gestrectomy), the small intestine has been joined to the remnant of the stomach. c: Inoperable cancer of the stomach: bypass operation (gastrojejunostomy) done so that food material can pass from the stomach to the small intestine.

advancing the stomach (Fig. 10. a–c)

- Coring out the tumour (thus establishing a passage) can be done by laser or ultrasound
- Insertion of tubes at the site of obstruction so that the lumen is available for the passage of food material
- *Gastrostomy* or *jejunostomy*, in which a tube is inserted in the stomach or small bowel by which food material in liquid form is fed in, thus providing the much needed nutritional support

Cancer of Stomach

Cancer of stomach occurs all over the world but its frequency varies in different countries. It is more common in Japan, Korea, China, Iceland, etc., possibly due to the high consumption of smoked fish, which could be one of the predisposing factors.

Signs and Symptoms

Patients of stomach cancer remain unaware of its presence for long unless the stomach wall and the surrounding structures are involved or there is widespread metastases. Late detection of the disease therefore explains the reason for poor prognosis.

Loss of appetite and weight are the common symptoms in over 95 per cent of the patients. Bleeding along with vomits may be also seen in a small percentage of cases. When the tumour enlarges in size and obstructs the passage of food material from the stomach to the duodenum (beginning of small intestine), then the patient begins to complain of vomiting and nausea. The tumour may be palpable from outside, when the tumour assumes a large size or when the patient is thin in constitution. Pain is a late feature and usually denotes advanced stage of the tumour.

Investigations

Barium meal examination of the stomach shows the presence of a cancerous tumour when the affected part of the

stomach is not filled by dye (space-occupying lesion) or the onward flow of barium is restricted in what is known as a 'cut-off' appearance.

Endoscopic examination of the stomach not only visualises the tumour but also corroborates its presence when a biopsy piece is taken for examination. It has been clearly shown that by this screening method not only is it possible to detect the stomach cancer in a very early stage (less that 5 mm size), but treatment too at this stage provides very good results. This has improved the survival rate of patients to more than 85 per cent for five years in Japan, Korea, etc. in comparison to ours, where it is less than 10 per cent.

Treatment

Treatment of gastric cancer is primarily surgical whereby the tumour is excised and continuity restored. Unfortunately, patients of stomach cancer usually visit the hospital at a very late stage, when it is not possible to offer much hope to the patients. In our country, 60 to 70 per cent of the patients are in such an advanced stage that it is neither possible nor feasible to excise the tumour. Under these circumstances, only palliative treatment will help, wherein a bypass operation (gastro-jejunostomy) is performed so that the passage of food from the stomach to the small intestine is facilitated (Fig. 10). Unfortunately, radiotherapy and chemotherapy do not help much in the management of stomach cancer.

Cancer of Large Intestine

Cancer of the large intestine (colon, rectum and anus) is a common form of cancer of gastro-intestinal tract, though in India, it is less common than in the West.

Colorectal cancer is usually found in old age, although at times it can be seen in the younger age group too. It has been noted that cancer, when seen in the younger age group, (less than 40 years) usually has a poorer outcome than in the older age group.

The cause of cancer of large intestine is not known, but a diet containing less of fibres (vegetables and fruits) and more of proteins and fats (meat, cheese, etc.) are known to predispose to cancer of colon and rectum. Further, among all the animal fat, consumption of beef is known to lead to development of cancer of large intestine. This may explain why cancer of the large intestine is more common in the Western nations than in Asia or Africa.

Certain diseases like familial polyposis, ulcerative colitis, Crohn's disease, etc. may give rise to cancer of colon over a long period of time, and for patients suffering from these ailments, regular check-ups including colonoscopy are an essential prerequisite to rule out the development of cancer.

Signs and Symptoms

Symptoms of colorectal cancer depend on several factors, namely the anatomical location of the tumour, its size and extent, and the presence of complications in the tumour.

Some carcinomas can be detected as part of a routine sigmoidoscopic and barium enema examination in a asymptomatic patient (not having any complaints). This strengthens the importance of regular medical examination to rule out the presence of cancer.

Cancer of large intestine varies in its presentation, depending upon whether it is present on right or left side.

Cancer of Right Colon

The patient usually complains of a dull, nagging, persistent pain in the lower part of the right side of abdomen. The tumour usually bleeds in the lumen of the intestine; this blood mixes with the faecal matter and the patients usually complain of dark coloured stools. The loss of blood leads to anaemia and the patient complains of pallor, easy fatigue, weakness, loss of appetite, loss of weight, etc.

Cancer of Left Colon

Tumour of left colon usually gives rise to obstructive features as the lumen of left colon is considerably less in diameter than that of right colon and the faecal matter at this site is also more solid. The patient complains of increasing constipation (may be alternating with diarrhoea), abdominal distention, etc. The patient may also complain of passage of blood or black coloured stools.

Cancer of anal canal and lower rectum may appear in the form of a swelling in the region of anus, seen and felt either during defaecation or otherwise also.

Visualisation of rectum and colon by introducing a scope (*proctoscopy, sigmoidscopy* or *colonoscopy*) may reveal the presence of tumour and it is also possible to excise a piece of tumour under vision for biopsy examination.

Barium enema (radiological) examination may also reveal the presence of tumour.

Patients with cancer of large intestine can have secondary deposits (metastases) in the liver at the time of their presentation in the hospital; therefore, it is advisable for them to have ultrasound or CT examination of the abdomen to see the presence of metastases in liver, lymph nodes, etc.

Treatment

Treatment for cancer of colon is mainly surgical, whereby the tumour-bearing segment is excised and the two ends are joined to maintain continuity.

If the cancer is in advanced stage, then the tumour cannot be removed, but palliative operation is done to bypass the tumour obstruction (Fig. 11).

The operation for cancer of rectum and anal canal involves excision of the terminal end of the rectum. The left-over end of the colon is brought out on the abdominal wall. This is medically known as *colostomy*. Presently, improved surgical techniques have made it possible to excise the tumour situated at a very low level of the rectum and restore the continuity, so that the rectal sphincter mechanism

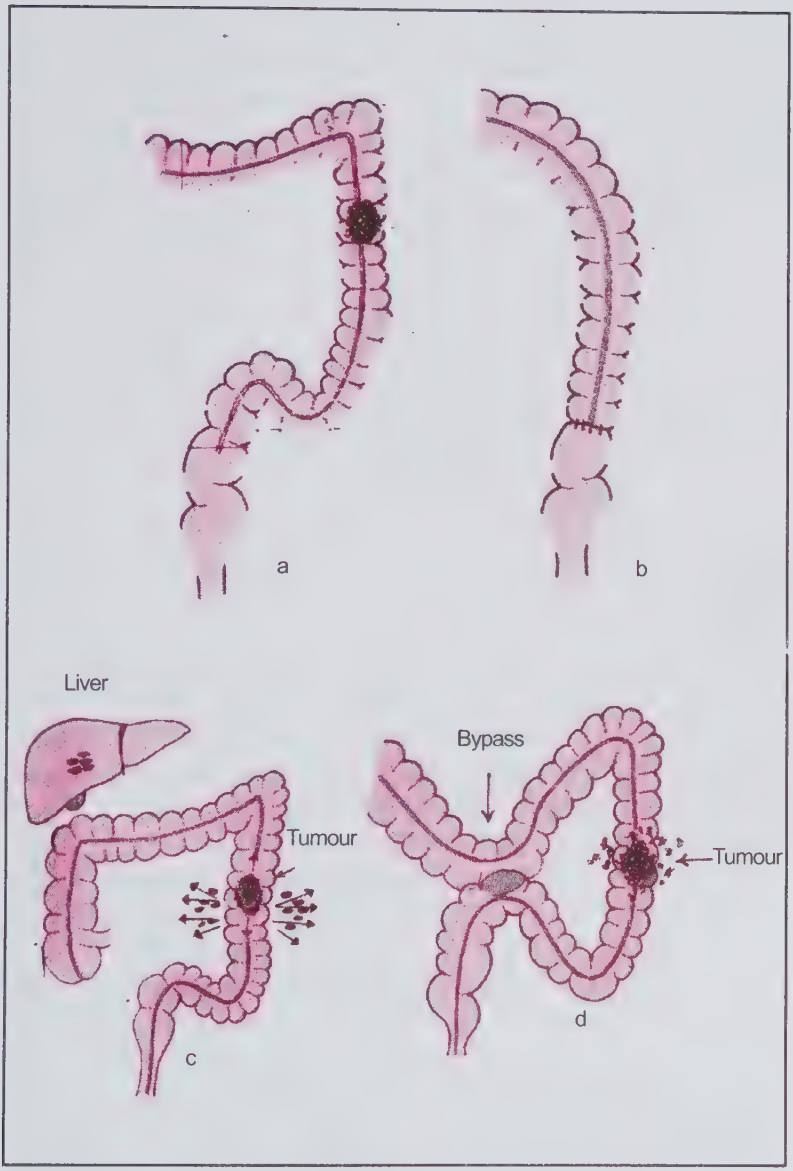


Fig. 11 a: Cancer of the large intestine showing area of excision. n: After excision, the ends of the colon have been joined. c: Inoperable stage, with the tumour spreading to surrounding area; the liver has secondary deposits. d: Advanced cancer of the large intestine. Bypass operation done.

is preserved and colostomy is avoided. The joining of two ends of the large intestine at a very low level is done either by modern surgical techniques or by automatic stapling devices, but, only if the tumour is at least 6 cms away from the anal opening and in good surgical condition.

The colostomy site is covered by a disposable polythene bag. The faecal matter gets collected in this polythene bag, which can be easily changed by the patient. In the initial phase, the faecal discharge through colostomy is very liquidy and so the discharge is quite frequent, but over a few days, the colostomy usually gets controlled in majority of patients and after a period of two or three months, the faecal matter is emptied out in the polythene bag, either once or twice a day only. The patient with colostomy is able to perform his or her normal activities and is socially accepted. As a matter of fact, majority of people are able to manage this so conveniently that even close friends and co-workers may not come to know about it.

Patients with colostomy may usually feel depressed and hesitant to socialise. This attitude is not desirable; the patient should learn to handle this infirmity and, if possible, attend group discussions held in many hospitals to learn how to interact with other similarly ill patients. These patients can become members of the Ostomy Association, which not only gives instructions in colostomy care, but also makes available disposable colostomy bags at a very nominal rate and teaches how to carry out their normal activities.

Radiotherapy and chemotherapy in combination with surgery have been found to have beneficial effects in the case of cancer of the anal canal. Presently it is recommended that such patients should initially be given chemotherapy and radiotherapy, which downstage the disease and the patient can be operated upon with better results. Preservation of the anal sphincter in a large number of patients is also possible. Radiotherapy and/or chemotherapy can be also given to these patients in the post-operative stage.

Piles and Cancer

Blood in the stool is a major symptom of bowel cancer and also of piles (*haemorrhoids*), but then it is imperative that these are not confused or misdiagnosed with each other. Piles do not cause cancer, but a few patients of cancer may erroneously consider themselves to be having bleeding from the rectum due to piles, thus missing the diagnosis of cancer disease in its early stages.

Similarly, it is also possible that a doctor may wrongly diagnose it to be a case of piles, depending upon the history of bleeding through the rectum and without thoroughly examining or investigating the patient; such an unfortunate possibility should be kept in mind.

Cancer of Lungs

Lungs are a part of the respiratory system which enable us to breathe. The right lung has three sections or lobes while the left has two (Fig. 12). Cancer of lungs is the commonest form of cancer in the Western countries. Cancer of lungs is closely associated with smoking. This is one of the few cancers in which the cause is known in majority of cases and is preventable to a certain extent. Approximately 90 per cent men and 80 per cent women, who develop lung cancer, are smokers. Unfortunately, in spite of the well-documented association, there has been little effect on the rising incidence of smoking. It has also been found that not only smokers are prone to develop cancer of lungs, but those who inhale smoke (passive smokers) because of their proximity to smokers are at a higher risk to develop cancer. It has been clearly shown that the number of cigarettes smoked per day and the length of period of smoking are directly connected to the risk of developing lung cancer. The type of cigarette also influences the risk, e.g. a filter-tipped cigarette apparently decreases the risk, while strong and poor quality tobacco increases it. Lung cancer has scarcely been heard of among the Sikh community, as their religion forbids them to smoke or use tobacco in any form.

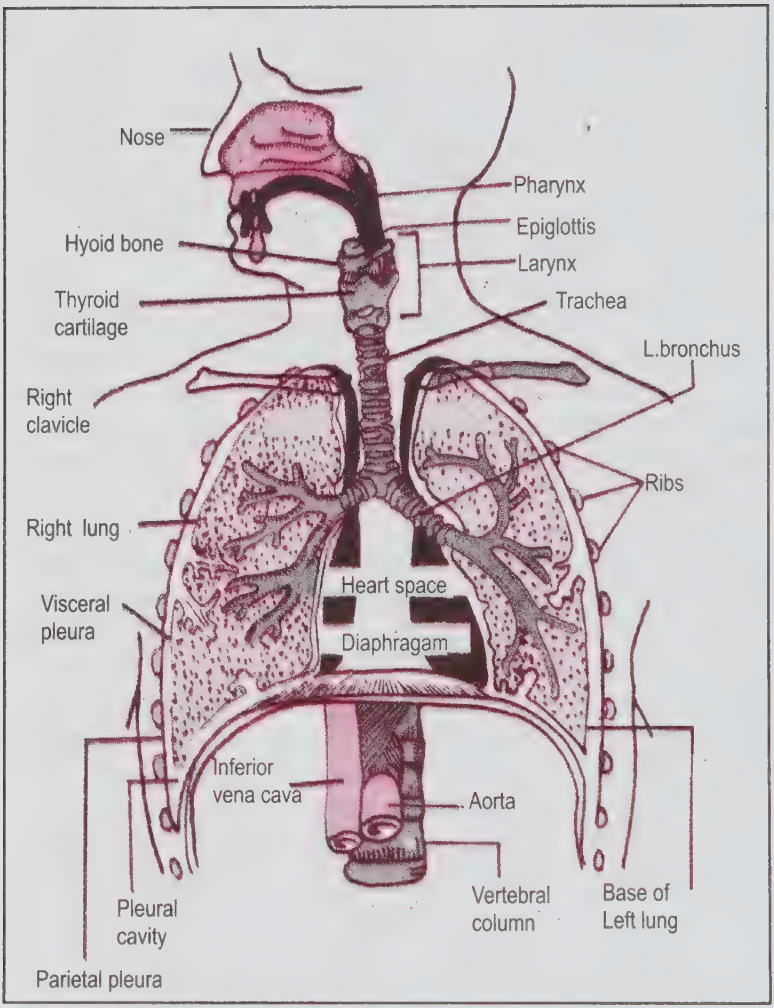


Fig. 12: Diagram of the respiratory tract.

There are several other risk factors in the occurrence of this disease:

- Exposure to carcinogens, like asbestos fibres, chromium, nickel, arsenic, and aromatic hydrocarbons. Risk from asbestos is particularly more pronounced when associated with cigarette smoking
- Chemicals, such as chloromethyl ether, are seen to lead

to development of lung cancer. Atmospheric pollution is therefore regarded as a predisposing factor
- Persons exposed to ionising radiations
- Persons with history of family members suffering from lung cancer
- Persons suffering from other diseases which can lead to formation of scars of the lungs

Clinical Features

Lung cancer is seen commonly in men of 45 to 60 years of age. The disease may remain without producing any symptom and may be discovered incidentally on routine chest X-ray. Chronic cough is the commonest symptom. *Haemoptysis*, i.e. blood in the sputum (in the form of blood streaking of sputum), occurs in about half of the patients. Chest pain of a dull, generalised type and difficulty in breathing may be the other common complaint. Fever, copious foul-smelling sputum, constant severe chest pain, hoarseness of voice, pain in the bones is seen in advanced cases of lung cancer. Loss of appetite and loss of weight may also be present.

Investigations

Chest X-ray, cytological examination of sputum, CAT scan, etc. may be helpful in establishing the diagnosis. Though lung cancer can be suspected from clinical presentation and chest X-ray, a confirmed diagnosis is made only by examination of the lung tissue by percutaneous aspiration needle biopsy.

Bronchoscopy is the important diagnostic technique for patients with suspected lung carcinoma. Through the bronchoscope, one can obtain a piece of the suspected tissue for biopsy examination.

Cytological examination or bronchial brushing may be helpful in detecting cancer.

Lung cancer has a poor outcome mainly because it is detected very late. Nearly 75 per cent of the patients are

beyond consideration for operative treatment when they are diagnosed.

The tumour extends directly towards the chest wall and may produce pleural effusion, i.e. collection of fluid between the lung and the rib cage. Lung cancer sends its metastases to the lymph nodes, liver and bone marrow.

Treatment

Treatment is by surgery, wherein resection of lung is done, but this is only possible in the early stages when the cancer has not spread locally. The role of radiotherapy in lung cancer is doubtful. It is usually combined with surgery either as a pre- or postoperative adjuvant treatment. Chemotherapy was earlier considered ineffective but with the advent of newer anti-cancer drugs like Docetaxal, the survival of patients with lung cancer has improved; particularly of patients with non-small cell lung cancer.

Breast Cancer

Cancer of breast was known even in 3,000 to 4,000 years B.C. Egyptian mummies were found to have cancer of breast. Cancer of breast is the second commonest cancer in Indian females, with incidents of cancer of uterine cervix being higher. In contrast, in Western countries, breast cancer is the common form of cancer in females. In USA it accounts for 25 per cent of all cancers seen in females, but according to Indian statistics, about 16 per cent of cancer disease is restricted to the breasts. The incidence of breast cancer seems to be rising in India also. Recent reports show that in metropolitan cities, like Mumbai and Delhi, breast cancer surpasses cancer of uterine cervix and has become the commonest form of cancer in females.

The peak incidence of breast cancer in India is in the age range of 35 to 50 years, whereas in Western countries it is 50 to 70 years, i.e. breast cancer is seen comparatively at an earlier age in our country and the probable reason for this difference is the lower longevity of life in India. It should

also be kept in mind that breast cancer may occur in males also.

The exact cause of breast cancer is not known, but a few correlations have been observed. Breast cancer is more common in spinsters, married women without children, mothers who have not breast-fed their children, women who have their first child after the age of 30 years, women whose mothers or sisters had cancer of breast, etc. However, these observations have been revealed by statistical analysis of breast cancer patients and should not be taken as predisposing factors.

Lack of health education coupled with inadequacy of medical help forces an Indian woman to ignore the minor early warning signals and in breast cancer, delay in seeking medical help is more pronounced, because of a sense of shame, false modesty, negligence of women, etc. Our own data show that about 65 per cent of breast cancer patients seek medical help more than six months after the onset of symptoms, and by doing this they forego or lose the most valuable time period. This delay, which is seen even among the educated, urban and well-off women patients, makes this curable cancer to progress and become inoperable and incurable. If checked in early stages, breast cancer has five years survival of more than 85 to 90 per cent, whereas in late stages it is hardly 12 to 15 per cent—thus clearly showing the great advantage of early management.

The early danger signals of breast cancer are:

- Swelling or thickening in breast
- Bleeding from nipples
- Non-healing ulceration (wound) over the breast
- Puckering or dimpling of skin over the breast, making it look like as orange peel
- Retraction or withdrawal of the nipple
- Swelling in the axilla

A patient who notices these signs should seek the opinion of a surgeon to exclude the possibility of cancer. The

importance of getting a breast swelling properly diagnosed by a surgical specialist cannot be over-emphasised. In India, a patient with breast problem usually goes to a gynaecologist, whereas a surgeon is the specialist who should be actually consulted for this.

Breast swellings are commonly seen in women, but majority of these are *benign* (non-cancerous). Fibroadenoma is the commonest type of swelling seen in the breast. This is non-cancerous and is commonly found in the younger age group—18 to 25-year olds. An experienced surgeon by clinical examination of the patient can distinguish between a cancerous and non-cancerous swelling; but, in 20 to 30 per cent of cases, even the most experienced surgeon may not be able to conclusively differentiate between the two. It is therefore, mandatory that pathological examination under the microscope is carried out for confirmation of the diagnosis. This pathological examination can be carried out by fine needle aspiration biopsy (FNAC) or excision biopsy examination.

Investigations

In addition to routine tests, the patient is investigated to locate metastases (secondary deposits) anywhere in the body. Breast cancer can spread locally to the overlying skin, the underlying muscles and ribs.

Lymph nodes draining the breast are present in the armpit, in the neck above the collar bone and below the ribs, just on the side of the sternum (chest bone), and are common seats of secondary deposits. The lymph nodes under the armpit and in the neck can be easily felt by the patient herself or by the doctor, but the lymph nodes present in the chest cannot be felt by examining fingers. Distant metastases from breast cancer can also reach the bones, liver, lung, brain, etc. It is therefore necessary to examine and investigate these areas also by an X-ray of the chest, ultrasound of the abdomen, total bone scan, etc.

The stage of the breast cancer is determined by the size

of the tumour and the presence of lymph node metastases in the axilla and elsewhere in the body.

Treatment

It is an established fact that the outcome of breast cancer treatment (as in any other form of cancer) is directly related to the stage of the disease at which the treatment is begun. Earlier the diagnosis is made and treatment started, better is the outcome. It has been recorded that if treatment is started when the breast tumour is less than 5 mm in diameter, then survival rate is 90 per cent, whereas if the treatment is started when the tumour size is more than 30 mm in diameter, then chances for survival are only 5 per cent.

Treatment of breast cancer has undergone a significant change during the last 20 years or so. Multi-disciplinary and multi-modality treatment, comprising surgery, radiotherapy, chemotherapy and hormone replacement is being used more and more.

Surgery

Surgery is still the standard form of treatment. *Radical mastectomy* (excision of the whole breast alongwith underlying muscles and the lymph nodes in the axilla), the commonest operation practised for the last 100 years, is no more used by most surgeons. The procedure has been replaced by *total mastectomy* in which only the entire breast tissue (underlying muscles not included) is excised alongwith overlying nipple and part of the skin. This is usually combined with *axillary clearance* so that all the lymph nodes draining the breast and present in the axilla are also removed. The total removal of the breast alongwith clearance of axilla is also known as *modified radical mastectomy*.

Many surgeons are becoming still more conservative. They advocate excision of tumour-bearing section of the breast only so as to preserve the breast. Patients with limited resections of breast are subjected to larger doses of radiotherapy and to concentrate radiation to the tumour area

(*radiation boost*). Long-term results of this conservative treatment, when compared with total mastectomy as also with radical mastectomy, reveal that the overall results are almost the same. But it is possible to conserve the breast only if the patient comes at a very early stage when the tumour is very small in size, so as to enable its excision alongwith some normal tissue, without sacrificing the entire breast. But unfortunately in our country, very few patients seek medical help at this early stage and at the same time very few Indian centres are undertaking this modality of treatment, although this is the current preferred mode of treatment in most centres of the world.

Radiotherapy

Following the operation, these patients are routinely subjected to radiation. Radiation is given to the neck, breast region and to other areas, and this is determined by the histopathological results of the excised breast tissue.

Chemotherapy

This is another important arm of multimodality therapy and is being now used more frequently on patients with cancer of breast. All young patients (who have not yet attained menopause) found to have secondaries in the axillary lymph nodes or anywhere else in the body are given chemotherapy in the post-operative period. Chemotherapy is given for six to eight cycles with a gap of three weeks between two cycles. A number of drugs are prescribed for patients of breast cancer and that too of two regimes—CMF and CAF, which are most popular. CAF regime is slightly more toxic but is supposed to be better than CMF therapy.

Both radiation and chemotherapy produce plenty of side-effects, like vomiting, difficulty in swallowing (particularly due to radiation), loss of appetite, loss of weight, loss of hair (more with CAF regime), weakness, lethargy, etc. However, all these complaints can be easily controlled and they disappear on cessation of the therapy. Chemotherapy,

in addition to destruction of the cancer cells, also produces depression of the bone marrow and therefore, the white blood cells (WBC), platelets and RBC (red blood cells) may decrease in number. It is very necessary to keep a close watch on these patients while administering chemotherapy or radiotherapy. This can be easily done by examination of the blood before each cycle of chemotherapy. Whenever the white blood cell count falls below 3,000 per cm, then the dose of the chemotherapy is either reduced or delayed so as to give a chance for recovery.

Hormone Therapy

Nearly 40 per cent of breast cancers are hormone dependent, i.e. the development and progression of cancer depends upon the level of female hormones in the body. In such cases, reduction of female hormones is achieved either by removal of ovaries (*oophrectomy*) or by giving drugs which prevent the action of hormones on the cancer cells. Removal of ovaries causes cessation of menstruation (menopause) in these females; obviously, the capability to conceive is also lost. Based on this, hormone therapy (oophrectomy or anti-hormone drugs) is the chosen mode of treatment and is being extensively used in patients of breast cancer.

Oestrogen and progesterone are the two female sex hormones present in the human body upon which breast cancer has been found to be dependent. Drugs which do not permit the naturally-occurring female hormones to act upon the tumour are considered beneficial for cancer patients. *Nolvadex* or *Oncotam* or *Tamoxifen* (names of the same drug) is the most commonly used drug for this purpose and is given in the dose of 20 mg per day. At present it is being recommended for a period of at least five years. Anti-oestrogen drugs have been found to give rise to hot flushes in a small percentage of patients and may even cause uterine cancer. Hence, female patients receiving the anti-oestrogen therapy are advised to undergo periodic examination of their uterus and ovaries to rule out the

development of malignancy in these organs.

It is now possible to find out whether in breast tumour, the oestrogen (ER) and/or progesterone (PgR) receptors are positive or not. Technology has advanced to such an extent that it is possible not only to evaluate whether ER and PgR are positive or not, but also determine the quantity present. Receptor-positive tumours (and those with a higher percentage positivity) are supposed to be hormone dependent and they respond better to the administration of anti-oestrogen drugs. But it has been found that even ER and PgR negative tumours also respond to anti-oestrogen drugs; hence, most of the treating doctors now prefer to give anti-oestrogen drugs to all patients of breast cancer.

The above form of treatment is suitable in cases of early breast cancer, and includes stages 1 and 2 of the disease. Stage 3 is known as *locally advanced breast cancer* (LABC), when the disease has spread beyond the breast region. Although there is no evidence of metastases in other parts of the body, there is a possibility that *micrometastases* (metastases in microscopic form, which cannot be detected even by the best of investigations) already exist and soon will make their appearance. Hence, merely local treatment (i.e. removal of the breast) is not sufficient for satisfactory treatment. These patients are first given chemotherapy, either alone or in combination with radiotherapy. A large percentage of patients do respond to it very favourably. Patients who respond to chemotherapy are usually given four to eight cycles of chemotherapy in the preoperative period and then subjected to surgery. The tumour shrinks in size and at times may even completely disappear. At times, chemotherapy also takes care of the micrometastases that may be present anywhere else in the body. These patients are subsequently operated upon. Patients, who did not have radiotherapy and the six to eight courses of chemotherapy in the pre-operative period, are given radiotherapy as also the remaining doses of chemotherapy so as to complete the treatment. As mentioned earlier, the majority

of treating doctors prescribe hormone therapy for these LABC patients.

Advanced breast cancer is seen in stage 4, where metastases or secondaries are seen. These patients are treated not only for breast tumours but for their secondary deposits too. Chemotherapy, hormone therapy and radiation may be given initially, but subsequently the operation may be undertaken depending upon the response and progress of the disease.

Breast cancer and its treatment (loss of breast and early menopause) are known to disturb the equilibrium of the sufferer and cause maladjustment in psychological, sexual, social and occupational spheres. These patients require a lot of understanding, help and moral support from all quarters; special responsibility falls upon the spouse, who should be understanding and ever willing to look after his partner.

Medical science has been making rapid strides in this direction. As mentioned earlier, breast conservation is now possible in cases of surgery of early breast cancer, and there is no need to sacrifice the entire breast. But, even if the entire breast has been removed, it is now possible either to place a prosthetic implant or undertake some other form of reconstructive surgery, so as to give an attractive contour resembling the normal opposite breast and a near-normal feel. Presently, however, not many Indian women with breast cancer seem to be interested in improving their physical appeal. This plastic reconstruction can be undertaken in our hospitals and patients can get it done even after an interval of a few years.

Early Detection

As of today, breast cancer is a disease which is not preventable, but early detection is the sure key to success of treatment.

After the age of 45 years, a monthly self-examination of the breasts (its systematic technique has to be learnt), an annual check-up by the doctor and mammography are the

important safeguards every female must undertake to ensure that she is free of this disease. This is much more relevant for patients who are high-risk candidates for development of breast cancer.

In addition to self-examination of the breast and clinical examination by a surgeon, breast cancer can be detected by a special X-ray of the breasts, known as *mammography*. Unfortunately, facilities for mammography exist only at a very few centres in India and is a costly exercise.

For early detection of breast cancer, regular self-examination of the breasts by the patient herself is recommended. This can be easily learnt and is being described subsequently. Normally this can be started at the age of 45 years, but women who have benign breast disease or a family history of breast cancer should start this right from the age of 35 years. From the age of 45 years, physical examination by a surgeon is recommended every year.

Mammography is another diagnostic examination that has been recommended for screening of breast cancer. It is regarded as a must in affluent Western countries where the incidence of breast cancer is quite high. Undertaken from the age of 45 years onwards, it is carried out every two years. For women with a strong family history of breast cancer, it is started earlier, possibly at the age of 35 years and carried out every year. In India, because of financial constraints, it has not become a very popular mode of screening but those who can afford it, should get it done from the age of 45 years; for high risk cases the screening should be conducted yearly once since the age of 35 years.

It is advised that records of all examination findings and investigation results should be maintained so that in the event of necessity, comparison can be facilitated.

Self-examination of Breasts

Self-examination of the breasts at regular intervals is a highly recommended procedure for screening. This enables a woman to detect any alteration in her breasts at a very early

stage; so, she can consult a surgeon and get the diagnosis established.

Self-examination should be carried out by every woman above the age of 45 years and preferably timed soon after the menstruation ceases. After menopause, continue self-examination of breasts on the same date of each month. It should be kept in mind that the milk-producing tissue in the breasts becomes active prior to the onset of menstrual period, to settle down once the period starts. In some women, the breasts in the pre-menstrual period feel painful and lumpy, especially near the armpits; this is just a normal physiological change and should not be misinterpreted.

One should not examine the breasts more than once a month, otherwise one may miss the small changes.

Process of Self-examination

Stand in front of a mirror, undress upto the waist, and

- look at the breasts from the front and the sides
- lift your arms above your head and again examine the breasts from the front and the sides
- lean forward and again examine the breasts
- press your hands on hips and examine your breasts; release the hands and examine again

It is quite normal to have one breast larger than the other and this may be present right since the onset of puberty, when the breasts start enlarging in size. But if any recent change is seen in size, then it should be carefully noted. Look for any change in the shape or colour of your breasts; any change in the nipples, particularly for any retraction or withdrawal of the nipple. Look for any swelling, dimpling of the skin, presence of any prominent abnormal vein or any obvious difference between the appearance of the two breasts, especially when caused by arm movements or by lifting the breasts. Squeeze both the nipples to see if there is any bleeding or discharge.

The breasts should be felt systematically, taking care that no part is left out. It should be clearly remembered that

a. Stand or sit in front of a mirror and undress upto waist.

b. Lift your hands above your head and look at the breasts.

c. Lean forward and again observe the breasts.

d. Press hands on the hips and examine your breasts.

e. Feel the breast systematically, with A+B arm above the head.

f. Feel the breast systematically, C+D arm by the side.

Fig. 13: Method for self-examination of breasts.

the breast tissue extends vertically from the collar bone to the lower part of the chest and sideways from the edge of the breast-bone to the side of the trunk. This entire area should be examined (Fig. 13).

For the sake of convenience, imagine the breast to be divided into four segments by two arbitrarily drawn lines, at right angles to one another and passing through the nipple. One can either stand in front of the mirror or sit on a stool or lie down on a bed. Some women prefer to carry out the examination with soapy fingers while taking a bath. The breasts should be felt with the soft pulp of the fingers and not by the fingertips. It is also recommended to keep the fingers of the examining hand together.

When examining the A and B segments, keep the hands of the same side on your head (under the head, if lying down) and when examining C and D segments, keep the hand by the sides of your body. Begin by examining segment A, starting at the breast-bone and work your way slowly to the nipple. Examine the breast tissue with a gentle rotating movement and feel for any lump or thickening which you did not feel during your last self-examination. Remember that the central part of the breast (nipple and areola) is slightly more firm to feel than the rest of the breast tissue.

Now examine the B segment. Bring down the hand and keep it on the side of the body; start examining C and D segments in the same manner. In the end, push the flat part of your hand under the armpit and feel that area. After completing the examination of one breast, examine the other breast in the same systematic and planned manner. The right breast should be examined by the left hand and left breast by the right. If you feel any lump, thickening or bumpy area in any part of the breast, however tiny and painless it may seem, consult your surgeon immediately who will thoroughly carry a check-up to rule out the possibility of cancer. Remember smaller the cancer swelling, earlier the treatment started and better is the prognosis. One can even hope for a complete cure in such a case.

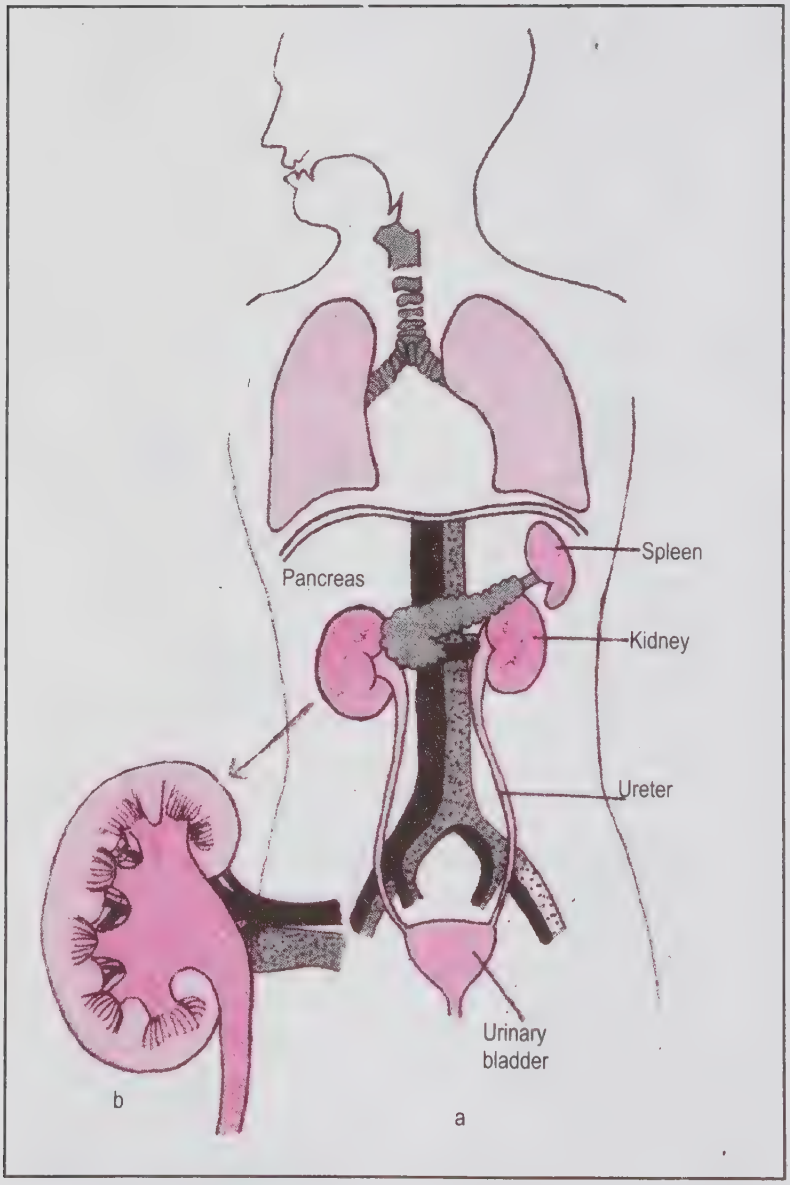


Fig. 14 a: Diagram of urinary system. b: Cut section of the kidney on the left.

CANCER OF URINARY SYSTEM

Kidney

Tumours of the kidney account for approximately 2 per cent of cancer deaths; the frequency of such tumours is twice in males than that in females.

Symptoms

Patients of kidney tumours present the following classical triad of symptoms:

- Pain, which may be present in 25 to 75 per cent of the cases
- Swelling (lump) in the loin, which is present in 6 to 60 per cent of the cases
- Blood in urine, known as *haematuria*, is present in 31 to 76 per cent of the cases
- Sometimes the patient may suffer from fever alone as the obvious complaint

It has been commonly observed that patients (and so also their family physicians) usually ignore these symptoms, probably because these symptoms (particularly the pain, haematuria and fever) resemble the complaints of kidney stone and the patients are treated with medicines, without establishing the correct diagnosis (Fig. 14). As a result, patients are usually late in seeking medical help. A significant number of patients (20 to 30 per cent) usually have secondary deposits in other parts of the body at the time of diagnosis. Presence of metastases indicates an advanced stage of the disease. The metastases may involve the lungs, bones, lymph nodes, skin, etc. Sometimes the patient may come with fracture of the long bone (as a result of metastases in the bone which makes the bone susceptible to fracture), completely unaware of the kidney tumour.

Investigations

- Plain X-ray of abdomen may show the enlarged size of the kidney

- Ultrasound examination is the investigation of choice and may help in detecting the presence of the kidney tumour during a preliminary investigation. It can also show the presence of metastases in the lymph nodes and in the renal vein, i.e. the draining vein of the kidney
- IVP (*intravenous pyelography*) is a special radiological investigation, in which a dye is injected intravenously and which is excreted out later by the kidneys. This way serial X-rays are taken, which may show the structure and function of the kidney. IVP reveals the location of the tumour with its classical distortions, as also the presence of the opposite kidney. The presence of the opposite kidney and its normal functioning has to be evaluated properly before undertaking surgical removal of the diseased kidney, since at times the opposite kidney may be either absent or be diseased
- CT scan of kidneys has presently replaced the use of IVP. It is helpful in accurate diagnosis of kidney tumours. It also facilitates evaluation of both the kidneys. CT scan can reveal the stage of malignancy and its spread to the surrounding structures, thus guiding the surgeon on its operability. Occasionally, arterio-graphy and venography (visualisation of arterial and venous systems of the kidney) may be helpful in showing the details

Treatment

The treatment is surgical, whereby the kidney tumour is removed alongwith the surrounding fat and local lymph nodes. This surgical procedure is known as *radical nephrectomy*. The operative incision may be made in the flank or in the abdomen, and at times, the surgeon may have to open the chest too, particularly if the tumour is very large or involves the upper pole of the kidney.

Post-operative radiation therapy may be employed, particularly when the operative clearance of the tumour is not adequate; but then the outcome is not encouraging in such a case.

A satisfactory chemotherapy regime has not been found for healing kidney tumours. Immunotherapy with Interluekin is encouraging under these circumstances but at present this is in the evolving phase.

It has been observed that following the removal of a kidney tumour, occasionally the metastases may regress. Metastases in the lung and bone may be surgically removed, particularly if single. Under these circumstances, the patients may have prolonged survival. The metastases can also be treated with radiotherapy.

Urinary Bladder

Carcinoma of the urinary bladder is one of the infrequent tumours. It usually affects in old age, past 50 years, and is more common in males than in females. Occupational exposure to the dye and rubber industry is a common cause of this cancer.

Chronic infections with *schistosomiasis* (a disease caused by a parasite, commonly seen in Egypt and other Middle Eastern countries), mechanical trauma due to stones in the urinary bladder, excessive smoking and coffee drinking have also been implicated in the causation of cancer of urinary bladder.

Symptomatology

Patients usually pass blood in urine (*haematuria*); the amount may be very small and thus invisible to the naked eye but it can be detectable through the microscope (*microscopic haematuria*). This passage of blood in urine is usually painless and could be in the form of clots too. The patient may complain of frequency of micturition, burning and pain while passing urine.

Investigations

In the early stages, a bladder tumour may not be detected by physical examination alone. Then intravenous pyelography may suggest a filling defect in the bladder which can be

confirmed on cystoscopic examination. Ultrasound and CT scan of the bladder can also diagnose and show the stage of the disease. When the suspicion of a bladder tumour is strong and it is not picked up by intraveous pyelography, or when ultrasound and CT scan facilities are not available, then a contrast can be introduced directly into the bladder through the urethra and X-rays taken (*cystography*). This will show a space-occupying lesion, suggesting the diagnosis of bladder tumour.

Management

Superficial small tumours which have not invaded the muscles of the urinary bladder are best treated by trans-urethral resection. Those tumours are known to recur and hence repeated examinations of the bladder, usually at three monthly intervals by a *cystoscope* is advised. If the tumour recurs frequently, then BCG (anti-TB vaccine), the most common agent, is instilled into the bladder as it helps in reducing the recurrence. When the muscle of the bladder is infiltrated by a tumour, then removal of bladder, by 'radical cystectomy', gives the best result. This can be treated by radical radiotherapy as it helps in bladder preservation too.

CANCER OF GENITAL ORGANS

Cancer of Prostate

Prostate is a secondary sexual gland, found only in males and is situated just below the urinary bladder. It surrounds the first 3 to 4 cms of the channel (*urethra*) that carries urine from the bladder to the outside. As a matter of fact, it can be said that the first part of the male urethra passes through the prostate gland; hence, any disease of the prostate, namely enlargement, infection or tumour, will obviously affect the normal micturition process.

The prostate contributes a part of *semen*—the fluid of male procreative activity. Some of the functions of prostate are known, but there are a few others which are still not

clear. Because of its location, the prostate gland cannot be directly felt but is examined by passing a finger through the rectum; or else an endoscope (*urethroscope*) is passed through the urethra. The normal prostate feels soft to firm in consistency. Feeling of irregularity or hardness by the examining finger gives rise to the suspicion of cancerous growth in the prostate (Fig. 15).

In a large proportion of males, after about the age of 50 years, because of some hormonal changes, the prostate gland starts increasing in size and gives rise to enlargement of the prostate. In India, this happens around the age of 45 to 50 years and in the majority of cases, the tumour is benign or non-cancerous in nature. This is known as *benign hypertrophy of prostate* and gives rise to difficulty in passing urine. This can however be managed effectively by *prostatectomy*, an

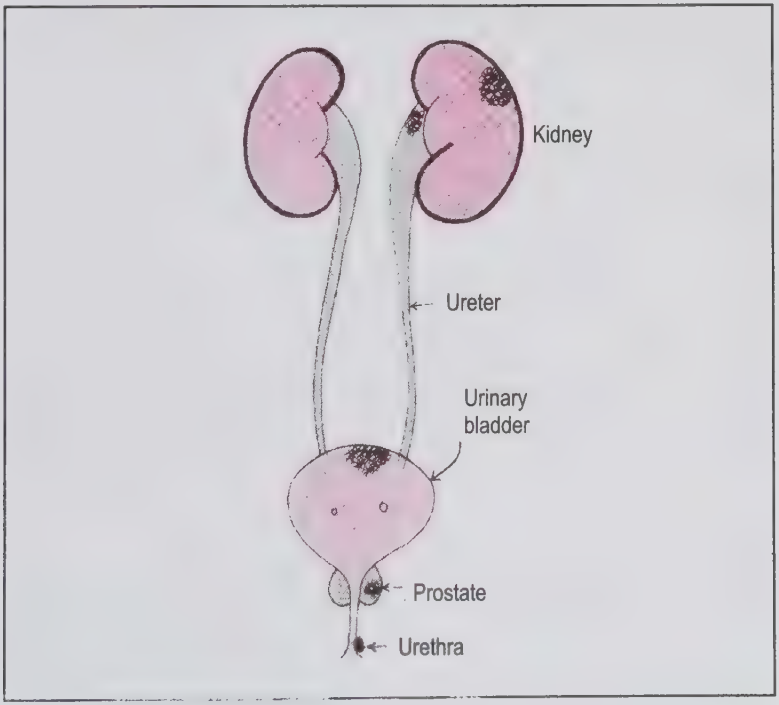


Fig. 15: Sites of tumours in the genito-urinary system.

operation in which the prostate is removed. But in a small percentage of the cases, because of uncontrolled division and growth of cells, the prostate may be the seat of cancerous growth. The cancer cells not only spread to the adjoining tissue, but can also produce distant metastases. The metastases produced by prostate cancer are mostly blood-borne and commonly seen in the lungs, liver, spine, pelvis and long bones. Symptoms of prostate cancer, either due to the effects of local pressure or because of distant metastases, are:

- Frequency of urination, particularly at night time
- Difficulty in starting the act of urination
- Thinning of urinary stream
- Inability to pass urine
- Blood in urine
- Burning and/or pain during urination
- Uncontrolled urination, resulting in wetting of clothes
- Persistent pain in the lower parts of the back, pelvis, long bones

Cancer of the prostate generally does not occur before the age of 50 years, but its incidence increases rapidly with advancing age. In a significant percentage of the cases, growth in the cancer of prostate may be very slow, with its presence never being detected/suspected except during the biopsy examination of the excised gland. Hence, it is mandatory that all the excised prostate glands should be thoroughly examined histologically; similarly, whenever there is suspicion on clinical examination, a biopsy should be done and the tissue examined.

Diagnosis

As in other cancers, suspicion on the part of the family doctor is an essential step for early detection of cancer of the prostate. Every male person above the age of 45 years should have rectal examination once a year as part of the annual medical check-up. It should be clearly remembered that both

benign hypertrophy of prostate and cancer of the prostate may co-exist in the same person and thus, in benign hypertrophy of the prostate, whenever there is doubt of malignancy, a biopsy should be obtained.

Estimation of *acid phosphatase* level in blood can indicate the presence of prostate cancer. *Prostatic specific antigen* (PSA), a new tumour marker, is more specific for cancer of prostate.

Treatment

- The tumour which is limited to prostate can be treated effectively by surgical removal of the gland
- In cancer of prostate, which has spread to surrounding tissues, the role of surgery is limited to keeping the urethral channel open by removing the prostate tissue through an endoscope. The process is commonly known as TUR (*transurethral resection*)
- Chemotherapy in prostate cancer is hormonal in nature. As the prostate gland is male hormone dependent, the treatment involves either giving female hormones or else decreasing male hormones by surgical removal of the testes. Similarly, surgical treatment and chemotherapy can be combined together to obtain maximum benefits
- Radiotherapy can be used to control the prostate tumour itself or to treat the metastases deposits

Cancer of Uterine Cervix

Cancer of uterine cervix is one of the commonest cancers in India. It can even reach the body of the uterus, but then, its incidence is very low.

Cancer of uterine cervix is commonly seen among women of low socio-economic status. The factors that are supposed to predispose to this disease are: poor hygiene, early marriage, multiple childbirths, and chronic infection of the genitalia.

Circumcision of husbands is supposed to markedly di-

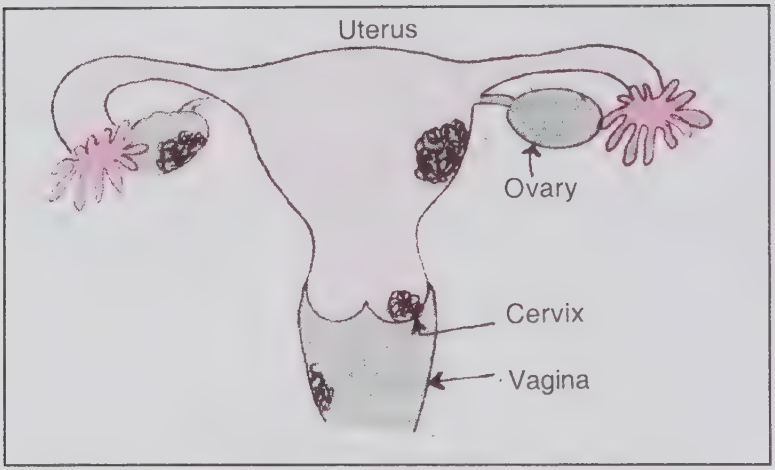


Fig. 16: Sites of tumours in the female genital system.

minish the incidence of cancer of uterine cervix amongst their wives. This is evident from the fact that cancer of uterine cervix is almost negligible amongst Muslim and Jew women.

Clinical Features

Unusual bleeding (not related to menstruation), vaginal discharge, bleeding at intercourse are the early symptoms of this disease. But again, all these symptoms may also be present due to reasons other than cancer of uterine cervix.

The patient complaining of these symptoms should be examined and subjected to a PAP test. This PAP test can be carried out in an outpatient clinic, where it takes no time and neither does it cause any pain or discomfort to the patient. In the PAP smear, a smear from the surface of the cervix is taken over a glass slide, stained and then examined under the microscope. It is now possible for a woman to take her own smear, stain it and then hand it over to a competent doctor for cytological examination. PAP test can also detect the pre-cancerous stage, when the cells show dysplastic changes, and if treated at this stage, the patient can be completely cured. As a matter of fact, thanks to the PAP test, Western countries have been able to bring down the

incidence of cancer of uterine cervix to a very low level.

All women at high risk should have the PAP test examination undertaken every six months, and all other women above the age of 35 years should have it at least once in two years, and subsequently after every three years, if the two initial tests are negative.

Treatment

Cancer of uterine cervix is usually treated with radiotherapy, but requires improved techniques and sophisticated equipments to obtain a high cure rate. Surgery is treatment of choice in cancer in very young women, and in situations associated with pregnancy. Outlook of the treatment is encouraging, if the disease is treated properly and at an early stage.

Ovarian Cancer

During the last 50 years, the death rate from ovarian cancer has doubled in the Western countries. It may be due to increased incidence of diagnosis but, a more likely reason is the result of an increase in its incidence. Ovarian cancer is quite uncommon before the age of 35 years, but the incidence increases rapidly with advancing age, reaching its peak in the 50 to 70 years of age group. About 45 per cent of the cases occur in women aged 45 to 65 years. Only 3 per cent of ovarian cancers are seen in women younger than 35 years.

Etiology

The etiology of ovarian carcinoma is unknown. The most common type of tumours are associated with childlessness, early onset of periods, late age for cessation of periods and a long number of years for formation of eggs in the ovaries. It is now known that the use of oral pill may play a powerful protective role. In about 1 per cent of the cases, family history of ovarian, uterine or breast cancer has been noticed. A woman with two or more close relatives affected by ovarian

cancer has about a 40 per cent chance of developing the disease. Half of this risk shows up before the age of 50.

Clinical Features

Abdominal pain and discomfort are the commonest complaints besides distention or feeling of a lump inside. There may be indigestion, urinary frequency, weight loss or loss of appetite, abnormal menses or post-menopausal bleeding.

All women, a few years prior to the cessation of periods and in the years after it, should have regular gynaecological examination every year alongwith sonography of the abdomen and the pelvis. By getting the ultrasound examination done yearly or six-monthly, ovarian cancer can be diagnosed at an early stage when the chances of cure are high. Otherwise, usually women turn to the specialist only at stage 3 of ovarian cancer, when the chances of survival become bleak.

Treatment

Treatment of ovarian cancer involves surgery mainly, followed by chemotherapy. If the patient is at stage 3 of ovarian cancer, then complete surgery may not be possible and the only alternative is to remove as much of the cancerous tissue as possible. Subsequently, chemotherapy is resorted to.

Carcinoma of Body Uterus

The median age of patients with cancer of uterus is 61 years, with 75 to 80 per cent of the women getting it after the cessation of periods. Only 3 to 5 per cent of the women, less than 40-years old, are victims of this form of cancer. Factors known to increase the likelihood of development of the disease are overweight, diabetes mellitus, childlessness, late age cessation of periods, hormone intake (oestrogen) and family history of cancer of breast, or ovary or large intestine. Nowadays, the incidence of cancer of uterus is increasing greatly compared to the earlier decades.

Clinical Features

Usually, women with cancer of the uterus are fat and may have diabetes mellitus and/or hypertension. The patient has abnormal vaginal bleeding which is inter-menstrual (in between menstrual periods) most of the times. Such patients, who are nearing the age of cessation of periods or have had cessation of periods, and experience irregular bleeding should undergo a fractional curettage of the uterus for the diagnosis. Such a woman should not take things lightly and should consult the gynaecologist immediately. If advised fractional curettage, she should undergo the procedure without wasting time. The tissue obtained at the time of fractional curettage should be sent for pathological examination, as only the pathologist can tell what type of disease it is.

Treatment

The mainstay of treatment for cancer of uterus is surgery. The uterus is removed alongwith both the ovaries and is followed by either radiotherapy, chemotherapy or hormone (progestrogen) treatment. If the patient undergoes surgery when the cancer is in its early stage, chances of cure are very high.

TUMOURS OF MUSCLES AND SOFT TISSUES

The following paragraphs describe the commonly occurring soft tissue tumours in the muscular system.

Fibrosarcomas

These are tumours arising from fibrous connective tissues, and are usually seen in the extremities and are devoid of pain in the early phase.

The treatment of choice is wide excision and if it involves a muscle, then that group of muscles is excised *in toto*. The patient needs to be followed-up closely as recurrences are common and the treatment is re-excision, and if necessary, amputation.

Liposarcoma
This arises from the fatty tissues and usually affects the extremities. Its peak incidence is seen during middle age. There is no evidence to suggest that pre-existing lipomas (benign lumps of fat) can become seats of malignancy. Curative treatment involves wide surgical excision.

Rhabdomyosarcoma
It is a malignant tumour involving the striated muscle cells. Occurring commonly in infants and young adults, it has a high incidence of metastases through the bloodstream, with rapid growth and fungation. Treatment involves wide excision of the tumour or particularly the involved group of muscles. In case of recurrence in any limb, amputation may be required as these tumours are not radio-sensitive.

CANCER IN CHILDREN

Cancer is commonly seen in older people though it can affect any age group. Childhood cancer is relatively infrequent and accounts for just 1 to 3 per cent of all cancers. It is estimated that approximately 35,000 to 40,000 new cases of cancer in children are diagnosed every year in India.

Unfortunately, childhood cancer is not being given due recognition and importance. Classic tell-tale symptoms and signs associated with cancer are rare in paediatric cancer. It is the alert parent who notices a seemingly unimportant complaint. Immediate appropriate action by a competent doctor enables early and prompt diagnosis. Appropriate therapy at early stages of the disease enhances cure rates. Majority of childhood cancers are eminently curable, with an overall success rate of 70 to 75 per cent being achieved in the developed world.

Cancer can occur at any age in childhood. As a matter of fact, babies are known to develop cancer even when they are in the wombs of their mothers. It is also well known that many of these tumours have very good prognosis

with treatment consisting of chemotherapy, surgery and radiotherapy.

Some childhood cancers have a genetic predisposition. These tumours have more than one affected family member. For instance, one out of every two children born to a parent with familial retinoblastoma is liable to develop a tumour. Similarly, certain herediatry diseases and syndromes have a strong association with cancerous tumours, a fact that can be explained by genetic factors. The vulnerability of children with Down's syndrome to develop acute leukaemia is well known, necessitating a thorough medical check-up at periodic intervals of three to four months. Paediatric malignancies are classified into two broad categories, namely, haematological or blood related (*leukaemia, lymphomas*) and solid tumours (kidney, adernal, etc.).

Leukaemia (Blood Cancer)

Leukaemia is the commonest form of childhood cancer. Although leukaemia occurs commonly in children and young adults, it affects people above the age group of 50 years too.

Leukaemia is commonly referred to as 'blood cancer' It can be acute or chronic leukaemia. Acute leukaemia constitutes nearly 95 per cent of all childhood leukaemias. The commonest types are acute *lymphatic leukaemia* (ALL per cent) and acute myeloid leukaemias (AML 25 per cent). In these conditions there is abundance of abnormal white blood cells (*leucocytes*) in the blood and hence, on its first identification the disease was designated leukaemia (white blood).

Blood consists of a fluid part known as plasma and a cellular part comprising red blood cells (RBCs), white blood cells (WBCs) and platelets. Normally the bone marrow releases hundreds of millions of new, normal cells of all types in the peripheral blood. These are fully developed, mature cells. When leukaemia strikes, many of these cells are immature white cells, i.e. not fully developed. As the disease progresses, these leukaemic cells fill up the bone marrow, inhibiting the production of normal blood cells of all types,

namely, WBCs, RBCs and platelets. Deficiency of these cells gives rise to their impaired function. Broadly speaking, deficiency of WBCs makes a person more susceptible to infections, while lack of RBCs causes anaemia. Deficiency of platelets gives rise to bleeding problems; clinical manifestations in leukaemia (anaemia, infection and/or bleeds) are a consequence of decreased numbers of normal blood cells.

Detection

There are no specific symptoms or signs which herald the development of leukaemia in children. In the early stages of the disease, there may be unexplained fever, which is a non-specific clue since it is a manifestation in a number of diseases. Prolonged fever of more than two weeks' duration, not responding to anti-microbial therapy, may provide the lead to existence of a neoplastic (cancerous) process.

Early cases can be suspected only by subtle alteration in blood counts. Blasts or leukaemic cells in the peripheral blood may not manifest at this stage. Diagnosis can, however, be clinched by examination of a bone marrow aspirate.

The most common symptoms of leukaemia are fatigue, pallor, skin bleeds, nose bleed or bleeds from other sources, sweating at night and pain in the bones. In children, some of these symptoms and signs may also be observed in infections or rheumatic fever. In advanced stages, the diagnosis is more apparent clinically. Additionally, manifestations include enlargement of spleen, liver, lymph nodes and kidneys, swelling of the gums and occasional skin nodules. Examination of the peripheral blood and bone marrow clinches the diagnosis.

Treatment

Leukaemia was designated as incurable till the late 1950s. Until 1947 there was literally no effective treatment for *acute lymphocytic leukaemia* (ALL). The average time from diagnosis till death was four months. In 1947, the first drug was discovered that could arrest the disease and attain

short-term remissions (no evidence of leukaemia). Almost all these patients eventually relapsed and died of complications of the disease. Advances in understanding of the biology of the disease, coupled with judicious and sequential use of multiple chemotherapeutic agents, have led to the cure of childhood leukaemia. In the developed world, almost 75 per cent of children with ALL can be cured (50 to 60 per cent in India) whilst cure rates in AML are about 35 per cent.

Treatment in ALL is divided into the following phases:

- Induction of remission (four to five weeks): remission can be attained initially in 85 to 90 per cent cases, with consolidation or intensification being five to 14 days
- The central nervous system directed therapy consists of intrathecal therapy and cranial irradiation (two to three weeks)
- Continuation therapy covers a period of two years. High quality supportive care is an essential component of the therapy, particularly in the first two phases of treatment. It consists of infection prophylaxis and maintenance of asepsis, broad-spectrum antibiotics against infections and administration of blood components (red blood cells for anaemia; platelets for bleeds)

Patients of leukaemia repeatedly require blood transfusions and hence the donors have to come forward to help. It is now possible to isolate and transfuse WBC or platelets alone and this has proved a great boon to patients of leukaemia, who usually do not die of the disease as such, but of its effects, mainly haemorrhage and infection.

A child who remains in a sustained first remission of five to six years can be deemed to be cured and can be expected to live a normal, disease-free life.

Acute mycloid leukaemia is more common in young adults. It has proved less responsive to chemotherapy than the acute lymphocytic form. Long-term disease-free survival is attained in just 30 to 35 per cent of cases with

chemotherapy. Bone marrow transplantation enhances cure rates to around 60 per cent.

Chronic leukaemia is uncommon in children. The only form seen is *chronic myeloid leukaemia* (CML), which constitutes a mere 4 to 5 per cent of all childhood leukaemias. Drugs help in providing symptomatic relief and in bringing blood counts to normal levels. In periods ranging from two to eight years, the disease develops gallopingly to ultimately transform into acute leukaemia.

Solid Tumours

There is a great diversity in the anatomical site and histological type of solid tumours in children. Some of the common tumours are neuroblastoma, Wilm's tumour, retinoblastoma, brain tumours, lymphomas, soft tissue sarcomas, etc. Common symptoms and signs in these tumours are mass lesions, whose effect on surrounding tissues and/or metastatic involvement is seen. The multi-modality treatment incorporating chemotherapy, surgery and radiotherapy is required for advanced stages of the disease. The prognosis is poor, with survival figures ranging between 20 to 35 per cent. Prognosis is good in those with localised disease (stages 1 and 2) and in infants (more than 12-months old), with survival figures being over 80 per cent.

Neuroblastoma

It is one of the most common abdominal tumours in children. It originates in the neural crest cells of the adrenal glands or the parasympathetic chain (para-vertebral). It usually occurs in the abdomen, thorax or pelvis. Common manifestations include fever, limb pains, abdominal mass, proptosis (bulging of eyes) and skull deposits. Most cases (70 per cent) are in an advanced stage at the time of diagnosis. Multimodality treatment incorporating chemotherapy, surgery and radiotherapy is required during the advanced stage of the disease. The prognosis is poor with survival figures ranging between 20 to 35 per cent. Prognosis is good in those with

localised disease (stages 1 and 2) and in infants (more than 12-months old), with survival figures being over 80 per cent.

Lymphosarcoma

Lymph glands, also known as lymph nodes, are scattered throughout the body, both just below the skin and in the depth of the body cavities. These act as filters, arresting the spread of body infections. These are commonly enlarged in several infectious diseases, including tuberculosis. Cancer of lymph nodes is known as lymphoma. In children there are two forms of lymphomas: non-Hodgkin's lymphoma and Hodgkin's disease. The former is generally a diffuse disease involving either the thoracic structures or abdominal organs or both. Hodgkin's disease is gradually progressive and is usually localised to one group of lymph nodes at the time of diagnosis. Combination chemotherapy is the mainstay of therapy in both types of childhood lymphomas, at all stages of the disease. The prognosis is very good with disease-free long-term survival being attained in 70 to 90 per cent of the cases.

Retinoblastoma

These are tumours of the eye, usually occurring in children below the age of four years. The first symptom is usually a 'white reflex' in the eye, which is indicative of a mass in the eye. This is usually associated with diminished vision. The tumour may be bilateral, especially in familial cases. Symptoms and signs are often misinterpreted as being related to infections and/or trauma, as a result of which a specialist is consulted when the tumour has spread beyond the confines of the eyeball. Surgery, with or without radiotherapy, is sufficient to attain high cure rates in those with localised disease. For the more advanced cases, a combination of chemotherapy (pre- and post-operative) is required in addition to surgery and radiotherapy.

Brain Tumour

Brain tumour is the second most common childhood malignancy, next to acute leukaemia. Headache, which is an associated symptom in several diseases, is a prime manifestation of brain tumour. Repeated early-morning headaches, with or without nausea or projectile vomiting that awakens a child or recurrent, incapacitating headaches must always arouse a suspicion of brain tumour. Other common symptoms and signs include visual defects, *papilloedema* (oedema of the optic disc), neurological deficit (e.g. *seizures*, weakness of limb, etc.), or *diabetes insipidus* (increased thirst and passing large quantities of urine).

The prognosis in brain tumour is not good unless the diagnosis is made at an early stage, when the tumour is localised and small. In such a situation, the entire tumour can be removed surgically. When the tumour is large, successful results have been attained by using combined modality treatment that includes chemotherapy, surgery and radiotherapy.

Wilm's Tumour

Wilm's tumour is cancer of the kidney and is as commonly seen as abdominal neuroblastoma. Wilm's tumour occurs most commonly in infants and young children (less than four-years old). Most often, the tumour comes to the attention of the parent whilst bathing/clothing the child. Abdominal pain and haematuria (passage of blood in urine) are some of the other symptoms. Success rates of over 85 per cent have been attained in all stages of the disease. Surgery and chemotherapy suffice for stages 1 and 2, whilst radiotherapy, in addition, is required for stages 3 and 4 of the disease. The drugs that are most effective in Wilm's tumour are Actinoymcin D, Adriamycin and Vincristine.

Bone Tumour

Bone tumours are generally seen in older children and young adults. The bones that are commonly involved are those of

the forearm, leg, pelvis and chest wall. Pain may not be an important feature but sooner or later a swelling and difficulty in using the arm or leg occurs. Pain and swelling in a bone are also features of inflammation (known as *osteomyelitis*); hence, the presence of these complaints by a child should be brought to the notice of a doctor and a definite diagnosis established. The treatment combines chemotherapy, surgery and irradiation. Recent trends in management focus on restoring optimal functions and avoiding disabling/mutilating surgery.

Investigations

Investigations in a child suspected to be suffering from cancer are aimed at (i) establishing the diagnosis, (ii) determining the extent of the disease, and (iii) monitoring the effects and response to therapy.

Diagnosis in haematological malignancies (leukaemia) can be established by abnormalities in the peripheral blood counts and by examining the bone marrow aspiration smears. Solid tumours, on the other hand, require obtaining material from the tumour tissue. This is possible either by a needle biopsy, open biopsy or by fine-needle aspiration cytology. Imaging studies including ultrasonography, CT scan and/or magnetic resonance imaging (MRI) enable an accurate assessment of the extent of the disease. The tumour tissue, even as small as 0.5 cm in diameter, can be picked up. The functional status of the organs involved can also be determined. Follow-up imaging studies could be used to assess response to therapy and confirm total eradication of the disease.

Biochemical markers exist for some tumours, e.g. urinary catecholaminers in neuroblastomia. Periodic monitoring of these markers could be done to confirm remission of the disease and to detect relapse at early stages.

Management

The most notable and striking advance in the management

of childhood cancer, has been the institution of multi-modal therapy, either concurrently or one after another. It has been increasingly realised that even though cancer manifests itself at one particular area, it is very often not a localised disease at the time of presentation. Local or distant spread is evident either clinically or after investigation in most cases. There exists a vast variation in the behaviour of different tumours and of the same tumour in different individuals, particularly in relation to age, sex, individual immunological status, etc. Hence, a multi-disciplinary approach involving the chemotherapist, the surgeon, the radiotherapist, pathologist, biochemist, physiotherapist, etc. is needed to tackle the disease. Each case needs to be treated individually, besides being discussed and assessed in detail by the entire treating group.

This multi-disciplinary and multi-modal management consisting of chemotherapy, surgery and radiotherapy has considerably improved the cure rates in childhood cancer. In childhood, acute lymphoblastic leukaemia, which was considered incurable before 1948, now has more than 70 per cent long-term survivals. Similarly, multi-modality treatment has helped attain more than 85 per cent long-term cure rates. In comparison, prior to 1958, it was only 20 per cent. It has become possible to treat the primary tumour and take care of the secondary deposits, such that even advanced cases are being greatly benefited. The message today is that childhood cancer is curable. Early recognition and rapid diagnosis will help in further improving disease-free survival rates.

Role of Parents

Regular examination and prompt investigation by the specialist constitute important steps in cancer detection. It is important to continue regular physical examinations throughout the pre-school years, if recommended by the family doctor. If, in between the regular examinations, any out-of-the-ordinary symptoms occur which do not subside in two weeks, then it should be reported to the doctor for a

detailed check-up. The following conditions warrant investigations:

(i) Swelling, lump or a mass in any part of the body; (ii) recurrent/persistent fever with or without bone joint pains; (iii) swelling and pain; (iv) pain or persistent crying in infant or child, for which no reason can be found; (v) pallor, fatigue, loss of weight; (vi) any change in the size or appearance of outward growths, such as moles or birthmarks; (vii) white lesion in eye; (viii) repeated early morning headaches or recurrent incapcitating headaches, nausea or vomiting for which there is no apparent cause; (ix) urinary retention; (x) bloody discharge of any sort, blood in the urine, heavy spontaneous nose bleeds or other types of haemorrhage; (xi) failure of bleeding to stop in the usual time, after a cut or injury; (xii) unexplained stumbling in a child who has been walking well; and (xiii) a general run-down condition, with unexplained loss of weight, sudden loss of appetite and anaemia.

Since none of the above-mentioned symptoms conclusively prove the presence of cancer, there is no need to panic if your child shows any of the above features. This book only attempts to educate the readers so that the early symptoms are not missed, as it has been established beyond doubt that prompt diagnosis and early treatment are important to the final outcome of cancer treatment. Due to recent advances in cancer therapy, a vast spectrum of different types of childhood cancer can now be cured.

Loving tender care, moral support and all-round encouragement are what these young patients require from their parents and friends. Management of children with cancer does not end with the completion of chemotherapy or surgery. A long-term follow-up and association with the oncologist is needed, not only to detect recurrences at the earliest and provide an effective cure, but also to monitor the late effects of therapy in children cured of their cancer.

6

FACTS AND MYTHS ABOUT CANCER

Facts

Worldwide research on various aspects of cancer has brought to light some basic facts about cancer. Cancer can occur at any age, right from childhood to very advanced age. Most of the cancers commonly occur after the age of 50 years but even a newborn child may already have or subsequently may develop cancer.

- Cancer can affect any part of the body; no organ is immune, though many organs are more commonly affected by cancer than others
- Cancer is not infectious; no one should be afraid of meeting or living with a cancer patient
- Cancer is not always fatal, and often it can be cured
- One out of three cancer patients can be cured and this is being achieved in USA. Roughly 33 per cent of all cancer patients are being cured, while 33 per cent of the remaining ones can be kept under control
- Prompt and effective treatment of cancer during the early stages may provide complete cure in 75 to 80 per cent of the patients
- Outcome of cancer treatment in most cases is directly related to the stage of the disease at which the treatment is commenced
- As in other diseases, the quality of treatment does matter in cancer treatment too. It is easily understood that doctors dealing specially with cancer diseases and specialised cancer centres are able to provide better to-

tal care than others

- In the early stages, cancer can be confused with other non-cancerous diseases. It has been noted many a times that cancer has been treated as tuberculosis, thus wasting a lot of time. The reverse has also been seen, when tuberculosis has been treated as cancer. Tissue biopsy or cytological biopsy examination (examination of the cancer tissue under microscope) is the only sure test for a definite diagnosis of cancer
- There is no secret or magic cure for cancer; so avoid wasting time, energy and money on quacks
- Cancer may be very fast-growing or it may remain latent in the body for as long as five to 40 years
- The incidence of cancer is rapidly increasing in India, probably because of the increase in longevity of life or due to newer and better diagnostic procedures that are available now
- Cancer is seen relatively at an earlier age in India
- Tobacco is definitely known to produce cancer

Myths

Illiteracy is one of the biggest curses in India. Health education is hardly available and lack of proper knowledge leads to wrong conceptions about the disease. Cancer in our country is thought to be a deadly disease with no hope of a cure. This, however, is not true.

The common myths prevalent in our country are:

- Cancer never leaves the body
- Cancer is incurable and deadly
- Cancer is painful
- Small swellings or wounds cannot be cancerous
- Cancer is infectious and passed on to others by close contact
- Cancer is a curse of God
- Cancer is a hereditary problem and passed on to offsprings. In a very few cases it may be correct, but in the majority of cases this is not true

7

CANCER IS NOT HOPELESS

Recent developments in cancer management show that cancer is not hopeless. The disease has to be fought on all fronts with sustained vigour, for then only it is possible to bring hope to the hearts of patients and their near and dear ones. Of late, increasing interest is being shown in 'alternative' or 'complementary' approaches to caring for cancer patients. This may be a revolt against the mechanical approach of modern medicine or could be a desperate search for a possible alternative cure, when all have failed.

Psychological Support

It is quite usual for many patients of cancer and their family members to experience the initial shock of diagnosis and subsequently, go into a state of depression. But this needs to be viewed in a long-term perspective. Restoration to a full emotional life is as important as successful treatment.

It is important to remember that a patient with courage, determination and desire to get well can fight the disease in a better way than a morose, depressed patient. It is equally worthwhile to remember that many types of cancer can be completely cured and the patient becomes as normal as anyone else. Only time can tell whether a patient has been completely cured or not.

A disease-free period of 10 years is taken to denote complete eradication of the disease.

In addition to inner strength, a cancer patient requires lots of support from his family. Moral support, proper

understanding, financial assistance, etc. are very necessary for early and complete rehabilitation and a peaceful, enjoyable life. Surgical treatment at times, may lead to physical disfigurement, including loss of sexual organs. Similarly, radiotherapy and chemotherapy can bring about sterility, loss of libido, early menopause, complete baldness, etc. The role of the spouse and other family members in alleviating this psychological trauma cannot be over-emphasised.

It is now possible to correct disfigurement to a great extent. For example, a new breast or penis can be constructed, potency or correct facial disfigurement provided, or muscles and nerves transferred so that a limb can function, but, all this depends on the mental and physical health of the patient. A patient can discuss all aspects of such reconstructive plastic surgical procedures with the treating specialist, who will guide properly, and if needed, will refer the patient to a surgeon with necessary expertise. The patient needs to be encouraged to participate in decisions about the type of care he needs and be helped to come to terms with his disease.

Follow-up Examination

Regular follow-up examination by a doctor is vital, not only to impart reassurance and encouragement that everything is alright, but also to detect any recurrence at the earliest stage. The gap between follow-up examinations keeps on increasing as time passes. Initially the check-up may be fortnightly and then may become monthly, annually and so on.

In the follow-up clinic, a patient not only volunteers his or her own feelings but also answers a number of questions put forth by the doctor. The doctor gives a thorough physical check-up and may advise some tests, X-rays, blood tests, scans, etc. Follow-up clinics are also useful for obtaining advice on medicine, diet, exercise, return to work, travel, etc. It is reassuring to know that everything is fine and there is no detectable recurrence of the disease. This is only possible by

undertaking regular follow-ups as per the advice of the treating doctor.

It is mandatory that a person who has suffered from cancer keeps a complete and detailed summary of his or her illness and treatment received, to show it to the doctor whenever any problem crops up.

Diet

A patient on discharge from the hospital may have to modify his or her diet, depending upon the surgical procedures undertaken, and of course, based on the requirements. The treating specialist or the hospital dietician will be the true guide and the key to any diet is to adopt a sensible, balanced and healthy approach.

A cancer patient, who has a normal digestive passage, can eat healthy, balanced meals or food that he or she enjoys. Normally also, a person should eat plenty of roughage in the form of fibre present in fresh fruits and lightly cooked vegetables, which also provide all the necessary vitamins. Fat intake should be lower; so avoid fried food.

A person who has lost a major part of his gastro-intestinal tract due to surgical procedures has to modify his diet. He should consume small quantities of food material and at frequent intervals, contrary to one or two large meals to which he may be accustomed. The meals should contain easily digestible food material of high caloric value. In other words, it means more of carbohydrates and proteins, and less of roughage.

At times, the patient may have to be fed through a tube. A dietician will be able to chart out a liquid diet with all the essential nutrients and with desired calories. This diet can be easily prepared at home with the help of a liquidiser.

Control of Pain

Pain may be a problem for patients with cancer in advanced stage, but with new drugs and therapeutic measures, one can not only anticipate the problem but can also undertake

measures to control it. Analgesics (pain-killers) are the initial drugs that are used and are given round-the-clock so that the patient never feels the pain. More potent drugs like Morphine and Codeine are administered to patients who do not respond to simple analgesics. Both Morphine and Codeine induce sleep, but judicious combination of analgesics with these drugs can provide a pain-free life, without causing undue sleeplessness. At times, proper treatment of the disease or of the recurrence itself can control the pain, and at other times, for the control of incapacitating pain, one may have to resort to acupuncture, local injection of anaesthetic drugs, some neuro-surgical operations, etc.

Return to Work

It is quite difficult to categorically say when a patient can go back to work for it depends upon the extent of surgery, institution of radiotherapy and chemotherapy, the complications that the patient has to face and the residual disease that has been left behind. It is also wise to remember that every patient reacts differently to a disease. It usually takes three to six months for a patient to feel well enough to return to work, although there are some patients who may continue to work (full or part-time) throughout the period of radiotherapy or chemotherapy. The patient should be allowed to return to work as and when he or she feels like doing so. Some patients may have to change the nature of their job, depending upon their handicap.

A large number of patients, who get well, go back to their original schedule of work. I have known many patients who have gone back to their work, like full-time consultancy in hospitals, flying aircraft, teaching in universities, manual labour, administration, etc. After all, nothing is more encouraging and reassuring than to be able to go back to one's own environment and lead a normal life.

Future Prospects

Extensive research is being undertaken all over the world on

all aspects of cancer, and many complexities of cancer problems are being solved; but the million dollar question that is eluding an answer is the absence of complete cure of a cancer patient. But who knows, the breakthrough may be achieved, sooner or later!

In case you face incurable cancer then try to be realistic and not lose hope. Take each day as it comes; plan positive things; do what you enjoy most; share your thoughts, feelings and fears with your friends and relatives, who are all there to help you but unable to say so openly. Hope is the keyword for all, particularly for cancer patients. This alone helps one to look forward to the coming days—a day for meeting friends, a day for taking a walk in the garden, a day for planning your child's future.

Remember, you are not alone and there are people who do care for you!

Glossary

Adenoma	A solid tumour of glandular origin.
Axilla	Armpit.
Bladder habit	Habit of urination.
Bowel habit	Habit of passing stools.
Bronchial	Relating to bronchus.
Bronchoscopy	Inspection of the interior of the bronchi (*plural* of bronchus) by an instrument.
Bronchus	The branching tubes emerging from the trachea, the wind-pipe.
Carcinogen	An agent causing cancer.
CAT scan	A computerised X-ray system that gives a clear picture of the affected part.
Chemotherapy	Treatment of diseases by chemical agents.
Chemotherapeutic agents	Chemical agents used for chemotherapy.
Colon	Large intestine.
Colostomy	To bring out colon through an artificial opening created in the abdominal wall, so that the patient now passes stool through this opening and not through the normal route.
Curative treatment	Treatment, which eradicates the disease and so cures the patient.
Cyst	A swelling containing liquid or gaseous material.
Cystoscopy	Visualisation of the interior of the urinary bladder by an instrument called cystoscope.
Cytology	Branch of biology concerned with the formation, structure, pathology and function of cells.
Cytological	Pertaining to cytology.

Diabetes mellitus	A disease of pancreatic aetiology, having high blood sugar level and passing sugar in urine.
Duodenum	First part of small intestine.
Dysplasia	Abnormal development of cells, tissues or organs.
Dysplastic	*Adjective* of dysplasia.
ECG	Electrocardiogram for checking the heart.
Endoscope	An instrument used for inspecting the inner parts of hollow organs, like the stomach, rectum, urinary bladder, etc., or tubes like urethra, trachea, etc.
Endoscopist	Specialist in the use of endoscope.
Gastrostomy	To make an artificial opening in the stomach.
Gynaecologist	A medical doctor specialising in diseases of female reproductive organs.
Histopathology	Study of the structure of diseased organs.
Hypertrophy	Increase in the size of an organ or a part due to enlargement, without increase in the number of constituent cells.
Larynx	Voice-box.
Latency period	Dormant period, i.e. the interval between inception of the disease and onset of symptoms.
Lymph nodes	Aggregation of lymphoid tissue.
Malignant	Abnormal growth that tends to metastasise.
Mammography	Examination of breast by X-rays.
Mastectomy	Removal of breast.
Metastasis	Transmission of disease from an original site to one or more sites elsewhere in the body.
Morphologically	Structurally.
Oesophagus	Food-pipe joining the mouth to the stomach.
Palliative treatment	Treatment, which arrests the progress of the disease and makes the patient more comfortable, but, without curing the disease.
Pap smear	Papanicolaou test, which is a microscopic

	examination of the cells exfoliated from the uterus and cervix.
Pharynx	Upper part of the digestive tract, from the mouth to the larynx.
Precancerous	Potentially cancerous.
Prognosis	Forecasting the cause of a disease.
Prostate	A secondary sexual gland found only in males and is situated just below the urinary bladder.
Radiotherapy	Treatment by radiation.
Rectal	Pertaining to rectum.
Rectum	Terminal part of the large intestine where faeces is stored before evacuation.
Recurrence	To come up again.
SGOT	Serum Glutamic Oxaloacetic Transaminase.
SGPT	Serum Glutamic Pyruvic Transaminase.
Stomach	Sac-like organ, where swallowed food material accumulates and the digestive process starts.
Ureter	Tube-like structure carrying urine from the kidney to the urinary bladder.
Urethra	Channel carrying urine from the urinary bladder to outside.
Urethroscope	An instrument used for inspection of the interior of urethra.
Urinary bladder	Sac-like organ, accumulating urine before it is passed out.
Varicose veins	Dilated, tortuous veins commonly seen in the legs.
Variegation	Marked irregularity, with differently coloured patches.
Wart	Small dry growth on the skin.

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Cancer is the most dreaded disease to affect mankind. This book not only educates people on seeking medical help as soon as it is detected, but also describes in lucid language the causal factors, danger signals and diagnostic methods of investigating the disease. It gives useful information on treatment and management of a cancer patient. Though intended mainly to educate the lay person, the book will be of use to paramedics too.

S.M. Bose is Professor and Head of Surgery at the Postgraduate Institute of Medical Education and Research, Chandigarh. He is recipient of Dr B.C. Roy Silver Jubilee Award for outstanding research in the field of medical and allied subjects, Dr B.C. Roy National Award as eminent medical teacher, Col. Pandalai Award from the Association of Surgeons of India, WHO and Union International Cancer Control Awards, etc. He has contributed more than 120 scientific articles in national and international journals, newspapers and magazines. He was President of Association of Surgeons of India for the year 2002 and also President of Indian Association of Surgical Gastroenterology, 1997-98.

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